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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

May 19–June 15, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended June 15, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—For the 4 weeks ended June 15 there were 2,685 cases of influenza reported, as compared with 3,236, 2,120, and 2,206 for the corresponding period in 1939, 1938, and 1937, respectively. While the disease was less prevalent than it was in 1939, it was about 20 percent above the preceding 5-year median figure for this period. The South Atlantic, East South Central, and Mountain regions reported excesses over the normal seasonal expectancy, but in all other regions the situation was quite favorable.

Poliomyelitis.—The reported number of cases of poliomyelitis increased from 66 for the preceding 4-week period to 179 for the current 4-week period. Of the total cases, the State of Washington reported 77 and California reported 44 cases. While an increase was apparent in practically all sections of the country, no more than 4 cases were reported from any other State. During the preceding 5 years there had been no cases of this disease reported from Washington during this period, and the average number reported from California was 23 cases. An increase of this disease is normally expected at this season of the year, but owing to the increases in the Mountain States the incidence for the country as a whole is slightly above the 1935–39 median incidence for this period.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria continued at a comparatively low level, 677 cases being reported during the 4 weeks ended June 15, as compared with 1,022, 1,260, and 1,367 for the correspond-

ing period in 1939, 1938, and 1937, respectively. A few more cases than might normally be expected were reported from the Mountain region, but in all other regions the incidence was relatively low. In all regions except the New England and Mountain the current incidence is the lowest recorded for this period in the 12 years for which these data are available.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period May 19–June 15, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	677	1,022	1,367	2,685	3,236	2,206	42,424	48,249	48,249	98	140	363
New England	22	12	46	10	6	12	7,291	8,099	7,475	0	10	15
Middle Atlantic	144	208	266	38	36	39	10,115	8,352	18,292	23	58	64
East North Central	153	213	297	258	304	314	7,656	4,797	12,999	19	15	51
West North Central	51	60	89	35	138	157	2,766	3,225	3,225	4	3	12
South Atlantic	119	173	181	977	1,396	451	2,456	6,366	4,157	17	15	95
East South Central	47	71	92	225	230	160	1,263	810	1,182	9	15	40
West South Central	99	137	166	671	705	705	4,314	2,637	1,424	14	12	26
Mountain	61	43	48	229	221	158	2,671	1,991	1,991	2	7	7
Pacific	81	105	132	239	200	809	3,860	11,942	7,555	4	5	19
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	179	217	164	13,172	10,046	17,805	243	1,057	839	572	875	875
New England	2	2	5	719	767	1,377	0	0	0	20	28	24
Middle Atlantic	10	10	10	4,768	2,816	4,913	0	46	0	68	71	74
East North Central	9	9	12	5,109	3,904	5,506	79	230	166	69	102	91
West North Central	7	4	4	747	808	1,925	90	331	412	49	40	45
South Atlantic	7	119	16	529	386	518	4	22	4	102	204	204
East South Central	9	6	8	342	219	192	23	147	5	69	87	115
West South Central	6	10	20	172	171	267	26	114	62	125	167	167
Mountain	6	19	3	197	321	387	17	39	109	25	29	30
Pacific	123	38	24	589	654	914	4	128	128	45	147	57

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

Measles.—The number of cases (42,424) of measles reported for the country as a whole was also relatively low. While the Middle Atlantic, East North Central, and Mountain regions reported excesses in the numbers of cases over the corresponding period in 1939, only 2 regions (the West South Central and Mountain) reported any definite increase over the 1935–39 median figure for this period.

Meningococcus meningitis.—The incidence of meningococcus meningitis (98 cases) was the lowest recorded for this period in the 12 years for which these data are available. Each section of the country shared in the favorable situation of this disease that now exists. During the preceding 4-week period there were 19 cases reported from New Mexico. A correction appeared in the PUBLIC HEALTH REPORTS of June 14, page 1093, changing that figure to 1 case.

Scarlet fever.—A decrease in scarlet fever of approximately 6,000 cases occurred during the 4 weeks ended June 15, as compared with the preceding 4-week period. A comparison with previous years indicated that the disease was more prevalent than it was last year at this time, but the number of cases (13,172) was only about 75 percent of the 1935–39 median figure for this period. In the South Central regions the incidence was somewhat above the seasonal expectancy; in the South Atlantic region the number of cases was about normal, while all other regions reported significant decreases from the seasonal average.

Smallpox.—For smallpox the comparison with previous years was quite favorable, the current incidence (243 cases) being the lowest on record for this period. Only one region, the East South Central, reported an excess of cases over the estimated expectancy, the cases (23) being more than four times the 1935–39 median figure in that region. In 1939 the incidence of smallpox was unusually high in the South Central regions during this period.

Typhoid fever.—Typhoid fever is still maintaining its favorable low level, as compared with previous years, the total number of cases (572) being only about 65 percent of the incidence in 1939, which figure also represents the 1935–39 median incidence for this period. In the North Atlantic, West North Central, and Mountain regions the incidence was about normal for this season of the year, but all other regions reported very definite declines from the normal seasonal expectancy.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended June 15, based on data received from the Bureau of the Census, was 10.9 per 1,000 inhabitants (annual basis). The average rate for this period in the 5 preceding years was 11.0.

STUDIES IN CHILDBIRTH MORTALITY[1]

II. AGE AND PARITY AS FACTORS IN PUERPERAL FATALITY[2]

By JACOB YERUSHALMY, *Statistician,* CARROLL E. PALMER, *Passed Assistant Surgeon, United States Public Health Service,* and MORTON KRAMER, *Assistant Statistician, New York State Department of Health*

The childbearing period for women extends roughly between the ages of 15 and 45 years. During this period the reproductive performance of individual women varies widely. Thus, during one year

[1] From the Division of Public Health Methods, National Institute of Health, U. S. Public Health Service, and the Division of Maternity, Infancy, and Child Hygiene, New York State Department of Health. The valuable assistance rendered by Miss S. Elizabeth Shearar is gratefully acknowledged.

[2] Presented before the Biometric Section of the American Statistical Association at the 101st Annual Meeting in Philadelphia, December 28, 1939.

in the country may be found women of the same age who are giving birth for the first time and for the twenty-fifth time. Groups of women of varying realized fertility are, obviously, differentiated by a multiplicity of factors ranging from the purely biological ones of sterility and partial sterility to the psychological and socio-economic factors involved in the differences in modes of life. The extent to which these factors are individually related to survival of mother and offspring may not easily be measured. However, the collective effect of all the factors as expressed in variations in the risk of death to mother and infant according to order of birth may be determined. Thus it was shown in a previous study (*1*) that the neonatal mortality and stillbirth rates are high for first births and for births of high orders and low for the intermediary orders of birth. Similarly, the rates are high for infants of very young and old mothers, and relatively low for infants of mothers in their twenties. It was also shown that these variations are independent of the correlation between order of birth and age of mother, for the differences in the rates according to one of these factors persisted when the effect of the other factor had been eliminated.

Our knowledge concerning the relation of age and parity to maternal mortality is meager. Little has been added on this subject since Coghlan's famous study in 1899 on childbirth in New South Wales (*2*) in which the risk of death to the mother was shown in relation to parity for all ages, and in relation to age in two groups, primipara and multipara. It is the object of the present paper to study in greater detail the relationship of parity and age of mother to childbirth mortality (mother and infant).

MATERIAL AND METHOD

This is the second of a series of studies on childbirth mortality. A description of the material and method was given in the preceding paper (*3*) and only a brief account will be given here. The studies are based on over a quarter of a million deliveries occurring in New York State (exclusive of New York City) in the 3-year period 1936–38. The data were derived from birth and death certificates received by the New York State Department of Health. The names of all women who died from a puerperal cause were searched in the index of births to determine whether a live or a stillbirth certificate was registered. Searches were also made in order to match the birth and death certificates of all infants who died under one month of age. The information from each of the matched certificates was brought together on a single punch card.

Women whose death was associated with abortion, miscarriage, ectopic pregnancy, and those who died undelivered were excluded since no birth certificate is filed for these conditions. There remain

only the deaths of mothers delivered of an offspring of viable age.[3] The risk of death to the mother which is associated with such deliveries was defined as "puerperal fatality." This risk was measured by a "puerperal fatality rate" defined as the number of deaths of mothers who were delivered either of a live birth or of a stillbirth per 10,000 total deliveries (including those of stillbirths).

During the 3-year period 1936–38, 255,727 women were delivered of 258,525 infants.[4] Of these infants 7,177 were stillborn and 7,550 died neonatally (under one month of age). During the same period 1,122 deaths of women were registered in which the primary cause of death was classified as puerperal. A thorough search in the vital statistics files produced birth and stillbirth certificates for 689 deliveries. From the statements on the death certificate, it was possible to establish with reasonable accuracy that for the remaining 433 women, pregnancy terminated either in an abortion or a miscarriage, that it was ectopic, or that the woman died undelivered. The puerperal fatality rate, as previously defined, was 26.9 per 10,000 deliveries.

ORDER OF BIRTH

Expectant mothers are generally considered in two main groups, primipara and multipara. Such classification is not entirely satisfactory for the purpose of describing the mortality of mother and infant. It is true that the rate of loss of both mother and infant is higher among first births than among subsequent births taken as a group. However, the rates of mortality do not continue to decline with increasing order of birth. For example, the neonatal mortality and the stillbirth rates of births of orders 5 and over are much higher than those of first births (*1*). Similarly the maternal mortality rate for women of high parity exceeds that of primipara (*2*). It is largely because the multipara are numerically weighted heavily by second and third births, for which the rate is lowest, that their rate is lower than that of the primipara.

The variation in infant and maternal mortality by order of birth assumes greater significance in view of the increasing proportion of first births which results from the decline in the birth rate. In New York State (exclusive of New York City) the proportion of first births increased from 28.8 percent in 1917 to 36.0 in 1936. The change in the composition of the population by order of birth is so rapid that when the 3-year period 1936–38 is compared with the first year of the series (1936), first births increased from 36.0 to 37.4 percent of all births. Correspondingly, births of orders 3 to 7 have declined from 34.8 percent in 1936 to 33.0 for the total 3-year period 1936–38.

[3] The term "an offspring of viable age" is used to denote a fetus which advanced at least to the fifth month of utero-gestation and which was registered either as a live birth or as a stillbirth.

[4] There were 2,754 pairs of twins and 22 sets of triplets.

In view of the differential mortality by order of birth, it appears that the groups with less favorable mortality rates are forming an increasingly larger proportion of the deliveries. Moreover, if the neonatal mortality rate gives an indication of the innate vitality of the infants, then the decline in the birth rate may be accompanied by a change in the vitality of the population.

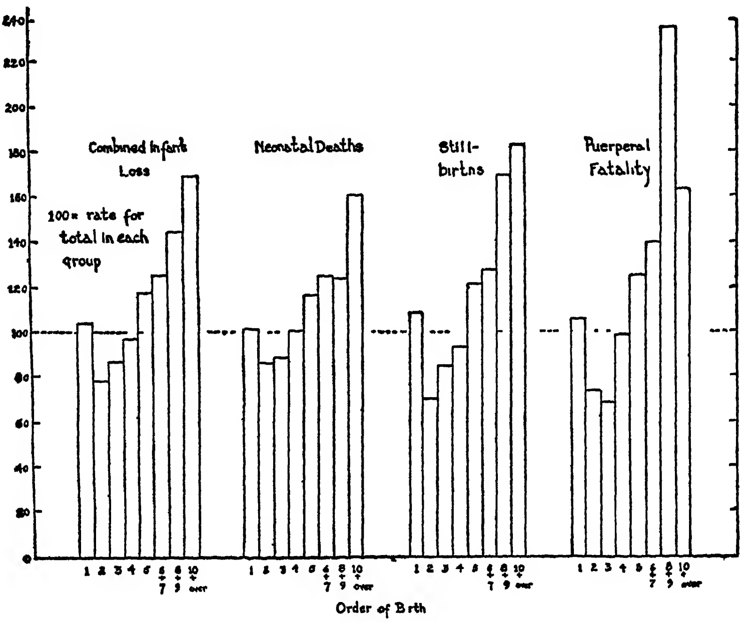

FIGURE 1.—Relative rates for combined infant loss (late fetal and neonatal mortality), neonatal mortality, stillbirths, and puerperal fatality by order of birth (rate for total in each group=100), New York State (exclusive of New York City), 1936–38

TABLE 1.—*Puerperal fatality, stillbirth and neonatal mortality rates by order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Total deliveries	Total births	Live births	Neonatal deaths	Stillbirths	Puerperal deaths	Rates: Combined infant loss	Rates: Neonatal mortality [2]	Rates: Stillbirths [1]	Rates: Puerperal fatality [3]
1	96 951	96 954	94,032	2,876	2 922	273	53 8	30 6	30 1	28 2
2	63 227	63 [illegible]74	62 728	1,625	1,246	125	44 9	25 9	19 5	19 8
3	35 117	35,794	34 949	933	845	65	49 7	26 7	23 6	18 5
4	20 954	21 396	20 839	633	557	56	55 6	30 4	26 0	26 7
5	12 404	13,198	12 752	447	446	44	67 7	35 1	33 8	34 1
6 and 7	14 [illegible]27	14,892	14 365	540	527	55	71 6	37 6	35 4	37 9
8 and 9	6 794	6 934	6 607	246	327	43	82 6	37 2	47 2	63 4
10 and over	5,202	5,324	5,052	244	272	23	96 9	48 3	51 1	44 2
Not stated	58	59	24	6	35	5	-------	-------	-------	-------
Total	255 727	258,525	251,348	7,550	7,177	689	57 0	30 0	27 8	26 9

[1] Stillbirth rates and rates for combined infant loss per 1,000 total births (including stillbirths).
[2] Neonatal mortality rates per 1,000 live births
[3] Puerperal fatality rates per 10,000 total deliveries.

Puerperal fatality and infant loss by order of birth.—Table 1 presents, according to order of birth, the distribution of live births, stillbirths, neonatal deaths, and puerperal deaths and their respective rates. Figure 1 shows the relative rates, i. e., in each group the rates by order of birth are shown in relation to the total rate which is taken as a base (=100). Such rates permit the comparison of the variation by order of birth between the stillbirth rate, the neonatal mortality rate, and the puerperal fatality rate, regardless of the difference in the absolute values of these rates. The actual rate for each of the former is over 10 times as high as for puerperal fatality.

The rate for combined infant loss (late fetal and neonatal mortality) was high for first births (59.8 per 1,000 total births), was at a minimum for second births (44.9), and thereafter increased continuously with order of birth. The rate for first births was higher by 33 percent than that of second births, while the rate for the highest orders of birth was more than twice as high as the minimum rate. The increase in the rate for first births as well as for the higher orders of birth in relation to the minimum rate was more pronounced for stillbirth than for neonatal mortality. Thus, the stillbirth and neonatal mortality rates of the first born were nearly equal. For births of orders 2 to 7 the neonatal mortality was higher than the stillbirth rate, while for births of orders 8 and over the reverse was true, the stillbirth rate being higher than the neonatal mortality rate.

The puerperal fatality rate was also high for mothers who were delivered of their first child (28.2 per 10,000 deliveries). The rate was lowest for mothers of third births (18.5) and highest for mothers who were delivered of their eighth and ninth child (63.4). The puerperal fatality rate and the rates for infant loss were lower for births of orders 2 to 4 than they were for first births. Beginning with the fifth order of birth the rates exceeded those of first births. The puerperal fatality and stillbirth rates were higher for primipara than for multipara taken as a group, the respective rates being 28.2 and 25.9 for puerperal fatality and 30.1 and 26.1 for stillbirths. In the case of neonatal mortality the rate was nearly as high for births of orders 2 and over (29.7) as for first births (30.6). The apparent advantage of the multipara, taken as a group, results from the fact that they consist for the most part of births of orders 2 to 4.

In figure 1 may be noted the similarity in the behavior of the puerperal fatality and the rate of infant loss by order of birth. The similarity is most pronounced when the relative stillbirth rates are compared with the relative puerperal fatality rates.

Causes of death.—The primary causes of puerperal deaths fall into four main groups: Toxemias (158 deaths), septicemia (157), accidents of childbirth (142), and hemorrhage (137). The remaining deaths are accounted for by puerperal embolism and thrombosis (53 deaths) and

accidents of pregnancy (40). The distribution of the 689 maternal deaths by order of birth and cause of death, and the cause-specific puerperal fatality rates per 100,000 deliveries are shown in table 2. The causes were taken from the statements on the death certificates. The classification is that of the Division of Vital Statistics of the New York State Department of Health according to the International List of Causes of Death (1929 revision) and the Manual of Joint Causes of Death.

TABLE 2.—*Distribution of puerperal deaths by cause of death and by order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Total puerperal deaths	Accidents of pregnancy (141)[1]	Puerperal hemorrhage			Puerperal septicemia (145)	Toxemias of pregnancy			Puerperal embolism and thrombosis (148)	Accidents of childbirth			Other and unspecified (150)
			Placenta praevia (144a)	Other (144b)	Total (144)		Eclampsia (146)	Other (147)	Total (146-7)		Cesarian section (149a)	Other (149b)	Total (149)	
1	273	9	4	35	39	73	53	19	72	22	28	30	58	-----
2	125	6	8	27	35	25	17	4	21	7	16	14	30	1
3	65	6	5	5	10	15	11	2	13	7	4	10	14	-----
4	56	7	3	9	12	13	8	1	9	5	2	8	10	-----
5	44	2	4	5	9	6	13	5	18	3	1	5	6	-----
6 and 7	55	2	8	12	20	8	8	2	10	5	2	8	10	-----
8 and over	66	8	6	6	12	14	8	5	13	4	2	12	14	1
Not stated	5	-----	-----	-----	-----	3	1	1	2	-----	-----	-----	-----	-----
Total	689	40	38	99	137	157	119	39	158	53	55	87	142	2
	RATES[2]													
1	281.6	9.3	4.1	36.1	40.2	75.3	54.6	19.6	74.2	22.7	28.9	30.9	59.8	-----
2	197.7	9.5	12.7	42.7	53.4	39.5	26.9	6.3	33.2	11.1	25.3	22.1	47.4	1.6
3	155.1	17.1	14.2	14.2	28.5	42.7	31.3	5.7	37.0	19.9	11.4	28.5	39.9	-----
4	267.2	33.4	14.3	43.0	57.3	62.0	38.2	4.8	43.0	23.9	9.5	38.2	47.7	-----
5	341.0	15.5	31.0	38.7	69.7	46.5	100.7	38.7	139.5	23.2	7.7	38.7	46.5	-----
6 and 7	378.6	13.8	55.1	82.6	137.7	55.1	55.1	13.8	68.8	34.4	13.8	55.1	68.8	-----
8 and over	550.6	66.7	50.1	50.1	100.1	116.8	66.7	41.7	108.5	33.4	16.7	100.1	116.8	8.3
Total	269.4	15.6	14.9	38.7	53.6	61.4	46.5	15.3	61.8	20.7	21.5	34.0	55.5	.8

[1] Figures in parentheses are International List numbers (1929 revision).
[2] Puerperal fatality rates per 100,000 deliveries.

It may be noted that the increase of puerperal fatality with parity was present for all causes of death. The higher rates for primipara were noted for septicemia, toxemia, puerperal embolism and thrombosis, and accidents of childbirth. The rates for hemorrhage and accidents of pregnancy were at a minimum for first births. This was particularly true for placenta praevia which registered a very low rate for the primipara. This is in agreement with the findings of Penrose (4) that the average parity of women with this condition is higher than that of a control group of mothers.

While the increase in puerperal fatality of the higher orders of birth was noted for all causes of death, there were some differences in the relative importance of the various causes by order of birth. The percentage distribution of the deaths by cause are shown below in

the three groups of first births, births of orders 2 to 4, and births of orders 5 and over.

Percentage distribution by cause

Order of birth	Total deaths (100 percent)	Accidents of pregnancy	Hemorrhage	Septicemia	Toxemia	Embolism and thrombosis	Accidents of childbirth
1	273	3.3	14.3	26.7	26.4	8.1	21.2
2-4	246	7.7	23.2	21.5	17.5	7.7	22.0
5 and over	165	7.3	24.8	17.0	24.8	7.8	18.2

It is seen from this table that there are no extreme fluctuations between these three groups. It is thus indicated that the difference in the puerperal fatality between the favorable middle group and either of the other two groups is not markedly concentrated in one or two of the causes. The main difference is noted for toxemias which comprised a considerably larger proportion of the deaths of the vulnerable groups than of the deaths in the intermediary birth orders. It is also interesting to note that septicemia was relatively less frequent as a cause of death the higher the birth order. Also worthy of note is the fact that deaths from hemorrhage form a far smaller proportion among primipara than among multipara.

TABLE 3.—*Puerperal fatality rates according to survival of offspring and order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Total puerperal deaths	Puerperal deaths associated with—				Puerperal fatality rates [1] associated with delivery of—				
		Livebirths			Stillbirths	Livebirths			Stillbirths	Stillbirth and neonatal deaths (combined)
		Total	Survivors	Neonatal deaths		Total	Survivors	Neonatal deaths		
1	273	200	171	29	73	21.3	18.8	100.8	219.8	175.9
2	125	93	81	12	32	14.8	13.3	73.8	256.8	153.3
3	65	41	34	7	24	11.7	10.0	75.0	284.0	174.4
4	56	36	32	4	20	17.3	15.8	63.2	359.0	201.7
5	44	28	23	5	16	22.0	18.7	111.9	358.7	235.2
6 and 7	55	39	28	11	16	27.1	20.3	203.7	303.6	233.0
8 and 9	43	22	17	5	21	33.3	26.7	203.3	642.2	453.8
10 and over	23	15	11	4	8	29.7	22.9	163.9	294.1	232.6
Not stated	5	5	4	1						
Total	689	479	401	78	210	19.1	16.4	103.3	292.6	195.6

[1] Puerperal fatality rates per 10,000 births (not deliveries).

Puerperal fatality according to survival of offspring.—As is known, there is a strong association between death of mother and loss of offspring. The puerperal fatality increases sharply when the infant is either stillborn or dies neonatally. The similarity in the behavior of the puerperal fatality rate and the rate for infant loss by order of

birth may suggest that the variation in puerperal fatality is a mere reflection of the fact that among the first births and the births of high order there are more deliveries associated with infant loss than among the intermediary orders of birth. That such is not the case is demonstrated by the fact that the variations in puerperal fatality by order of birth persist also for all deliveries in which the infant survived the first month of life. This may be seen from table 3 which presents the puerperal fatality rate by order of birth separately for mothers of surviving infants, of neonatal deaths, and of stillbirths. The rates in this table are based on births (number of infants, not deliveries) in order to avoid the complicating factors of twins in which one survived and the other was either a stillbirth or a neonatal death. The death of a mother in such a case was counted in the stillbirth or neonatal death group. Rates based on births differ only slightly from those based on deliveries since plural births form only about 1 percent of all deliveries.

It may be observed that the higher rates of the high orders of birth were present irrespective of outcome of pregnancy. However, the rate among the mothers of first births was higher than among the mothers of the intermediary orders of birth only when the infant was born alive. For mothers of stillbirths the rate was lowest for primipara. The rates were higher for first than for the intermediary orders of birth both among mothers of survivors as well as of neonatal deaths.

Premature birth.—Over 5 percent of the deliveries terminated prematurely. The rate for combined infant loss was 18 times as high among the premature as among the full-term infants. Puerperal fatality was 7 times as high when pregnancy terminated prematurely.

Table 4 presents the distribution of the births, infant losses, and puerperal deaths by order of birth for full-term and premature deliveries.

The incidence of premature deliveries by order of birth again followed a U-shaped curve. Premature deliveries were more frequent among first births than among births of orders 2 to 5. Among births of orders 6 and over they were relatively more frequent than among first births. The incidence was lowest among second births.

The rate of infant loss among the premature increased continuously with order of birth. It was lowest for first births. Among the full-term infants the rate for first births was higher than that of births of orders 2 to 4, with a minimum rate recorded for second births. More than 2 out of every 3 premature infants of birth orders 10 and over were lost. Similarly, in puerperal fatality the disadvantages to the primiparous women were more pronounced for the full-term deliveries than for the premature. Only second births had lower puerperal fatality rates than first births when delivery was premature, while in the full-term group the puerperal fatality rate did not exceed

that of first births until the sixth and seventh delivery. Both in puerperal fatality and in infant loss the rate for first births was higher than the total rate in the full-term group, and lower than the total rate among the premature.

TABLE 4.—*Incidence of premature birth, combined loss of premature and full-term infants, and puerperal fatality associated with premature and full-term deliveries by order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Deliveries		Births		Combined infant loss		Puerperal deaths associated with—		Rates				
									Incidence of premature deliveries[2]	Combined infant loss		Puerperal fatality associated with[5]—	
	Full-term	Premature	Full-term	Premature	Full-term births	Premature births	Full-term deliveries	Premature deliveries		Full-term births[3]	Premature births[4]	Full-term deliveries	Premature deliveries
1	91,086	5,868	91,086	5,868	3,000	2,798	203	66	60.5	32.9	476.8	22.3	112.5
2	60,356	2,871	60,806	3,168	1,230	1,641	94	30	45.4	20.2	518.0	15.6	104.5
3	33,507	1,610	33,984	1 810	821	957	44	21	45.8	24.2	528.7	13.1	130 4
4	19,936	1,018	20,263	1,133	556	634	35	20	48.6	27.4	559 6	17.6	196.5
5	12,212	692	12,438	760	407	486	27	17	53.6	32.7	639.5	22.1	245 7
6 and 7	13,658	869	13,941	951	474	593	37	17	59.8	34.0	623 6	27.1	195.6
8 and 9	6,366	418	6,477	457	271	302	28	14	61.6	41.8	660.8	44.0	334.9
10 and over	4,839	363	4,927	397	242	274	14	9	69.8	49.1	690.2	28.9	247 9
Not stated	40	18	41	18	23	18	5	------	------	------	------	------	------
Total	242,000	13,727	243,963	14,562	7,024	7,703	487	[1] 194	53.7	28.8	529.0	20.1	141.3

[1] There were 8 other puerperal deaths for which period of gestation was not stated.
[2] Per 1,000 total deliveries in each specified category.
[3] Per 1,000 total full-term births in each specified category.
[4] Per 1,000 total premature births in each specified category.
[5] Per 10,000 deliveries in each specified category.

THE AGE FACTOR

The analysis of childbirth mortality (mother and infant) by mother's age presents a picture somewhat similar to that by order of birth. The main difference is the fact that the increase in mortality at the older ages is more pronounced in loss of mothers than in the loss of offspring and that, whereas the infants of the very young mothers suffer relatively high neonatal mortality and stillbirth rates, the puerperal fatality for these women is at a minimum.

Table 5 presents the distribution, by age of mother, of live births, stillbirths, neonatal and puerperal deaths, and their respective rates. Figure 2 shows the relative rates, i. e., in each group the rates by age of mother are shown in relation to the total rate which is taken as a base (=100).

The stillbirth and neonatal mortality rates were relatively high for infants of the youngest mothers. The stillbirth rate was at a minimum when the mother was in the 20–24 year age group; the neonatal mortality rate was lowest for infants of mothers aged 25–29 years. Both rates were high when the mother was over 40. The

puerperal fatality rate was lowest for the youngest mothers and increased continuously with age.

TABLE 5.—*Puerperal fatality, stillbirth and neonatal mortality rates by age of mother, New York State (exclusive of New York City), 1936–38*

Age of mother	Total deliveries	Total births	Live births	Neonatal deaths	Stillbirths	Puerperal deaths	Rates			
							Combined infant loss [1]	Neonatal mortality [2]	Stillbirths [1]	Puerperal fatality [3]
Under 20	22,624	22,751	22,176	841	575	35	62.2	37.9	25.3	15.5
20–24	77,920	78,589	76,949	2,179	1,640	130	48.6	28.3	20.9	16.7
25–29	72,545	73,361	71,609	1,846	1,752	170	49.0	25.8	23.9	23.4
30–34	47,750	48,422	46,936	1,400	1,486	157	59.6	29.8	30.7	32.9
35–39	25,597	25,990	24,890	892	1,100	128	76.6	35.8	42.3	50.0
40 and over	9,237	9,358	8,774	389	584	69	104.0	44.3	62.4	74.7
Not stated	54	54	14	3	40					
Total	255,727	258,525	251,348	7,550	7,177	689	57.0	30.0	27.8	26.9

[1] Stillbirth rate and rate for combined infant loss per 1,000 total births (including stillbirths).
[2] Neonatal mortality rate per 1,000 live births.
[3] Puerperal fatality rate per 10,000 total deliveries (including those of stillbirths).

Mothers aged 20–24 years had 31 percent of the live births, but only 23 percent of the stillbirths and 19 percent of the puerperal deaths. Mothers in their twenties accounted for 59 percent of the live births, 47 percent of the stillbirths, and 44 percent of the puerperal deaths.

From figures 1 and 2 it is seen that, while the puerperal fatality, the stillbirth, and the neonatal mortality rates were very similar in their variation by order of birth, there were notable differences in the behavior of the three rates by age of mother. The neonatal mortality rate presented a rather smooth U-shaped curve. The rate for infants of the oldest mothers was nearly the same as that of infants of the youngest mothers. The stillbirth rate increased much more rapidly with advancing age of mother, but also exhibited a slightly higher rate for the youngest mothers. In puerperal fatality the rate for the youngest mothers was least and the increase in the rate with advancing age was more pronounced than even that of the stillbirth rate. Thus it would appear that the age factor is more closely related to puerperal fatality than to the stillbirth rate and that the latter is in turn more affected by age of mother than the neonatal mortality rate.

Causes of puerperal death.—Table 6 presents the distribution of puerperal deaths by age and by cause of death and specific fatality rates per 100,000 deliveries. The increase in the rate with advancing age was noted to a considerable degree for each group of causes. The increase was more pronounced for some causes than for others. It was most rapid for placenta praevia, which had a very low rate for the youngest mothers and increased continuously to a rate of 54.1 per 100,000 deliveries for the oldest mothers. This again agrees with

the findings of Penrose (4). The relative importance of the causes of death is different in the various age groups. The two most frequent causes among mothers under 30 years of age were septicemia and toxemia. As the mother's age increased, deaths from septicemia formed relatively smaller proportions of the total deaths and the

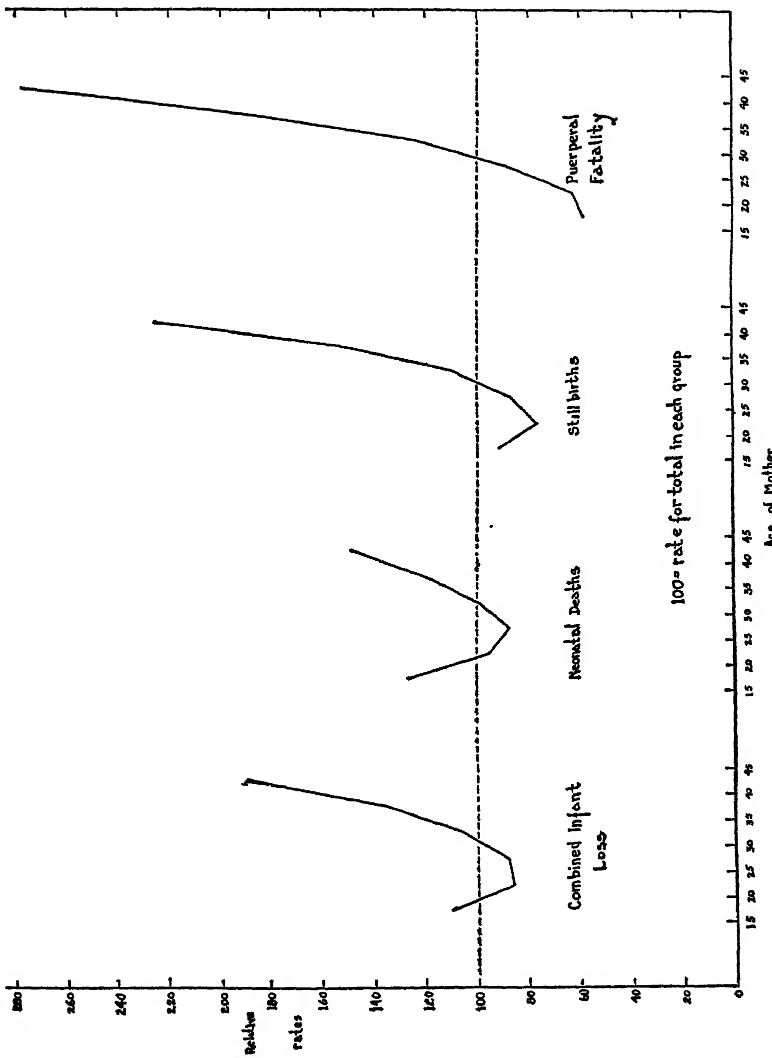

FIGURE 2.—Relative rates for combined infant loss (late fetal and neonatal mortality), neonatal mortality, stillbirths, and puerperal fatality by age of mother (rate for total in each group=100), New York State (exclusive of New York City), 1936–38

other two groups of causes, hemorrhage and accidents of childbirth, assumed increasingly more important roles. The result is that for mothers aged 35 and over the rates for hemorrhage, toxemia, and accidents of childbirth were nearly equal, while the rate for septicemia was lower than either of these.

The variation in puerperal fatality by age for mothers of surviving infants, of neonatal deaths, and of stillbirths is shown in table 7.

TABLE 6.—*Distribution of puerperal deaths by cause of death and by age of mother, New York State (exclusive of New York City), 1936–38*

Age of mother	Total puerperal deaths	Accidents of pregnancy (141)[1]	Puerperal hemorrhage			Puerperal septicemia (145)	Toxemia of pregnancy			Puerperal embolism and thrombosis (148)	Accidents of childbirth			Other and unspecified (150)
			Placenta praevia (144a)	Other (144b)	Total (144)		Eclampsia (146)	Other (147)	Total (146-7)		Cesarian section (149a)	Other (149b)	Total (149)	
Under 20	35	1	------	7	7	11	8	1	9	1	1	5	6	------
20–24	130	7	2	16	18	40	27	10	37	5	7	16	23	------
25–29	170	9	10	23	33	41	28	7	35	18	10	23	33	1
30–34	157	9	8	26	34	36	24	5	29	13	18	18	36	------
35–39	128	5	13	18	31	19	21	12	33	9	14	16	30	1
40 and over	69	9	5	9	14	10	11	4	15	7	5	9	14	------
Total	689	40	38	99	137	157	119	39	158	53	55	87	142	2
	RATES[2]													
Under 20	154.7	4.4	------	30.9	30.9	48.6	35.4	4.4	39.8	4.4	4.4	22.1	26.5	------
20–24	166.8	9.0	2.6	20.5	23.1	51.3	34.7	12.8	47.5	6.4	9.0	20.5	29.5	------
25–29	234.3	12.4	13.8	31.7	45.5	56.5	38.6	9.6	48.2	24.8	13.8	31.7	45.5	1.4
30–34	328.8	18.8	16.8	54.5	71.2	75.4	50.3	10.5	60.7	27.2	37.7	37.7	75.4	------
35–39	500.1	19.5	50.8	70.3	121.1	74.2	82.0	46.9	128.9	35.2	54.7	62.5	117.2	3.9
40 and over	747.0	97.4	54.1	97.4	151.6	108.3	119.1	43.3	162.4	75.8	54.1	97.4	151.6	------
Total	269.4	15.6	14.9	38.7	53.6	61.4	46.5	15.3	61.8	20.7	21.5	34.0	55.5	.8

[1] Figures in parentheses are International List numbers (1929 revision).
[2] Per 100,000 deliveries.

TABLE 7.—*Puerperal fatality rates by age of mother and survival of offspring, New York State (exclusive of New York City), 1936–38*

Age of mother	Total puerperal deaths	Puerperal deaths associated with—				Puerperal fatality rates[1] associated with delivery of—				
		Live births			Stillbirths	Live births			Stillbirths	Stillbirths and neonatal deaths (combined)
		Total	Survivors	Neonatal deaths		Total	Survivors	Neonatal deaths		
Under 20	35	27	24	3	8	12.2	11.2	35.7	139.1	77.7
20–24	130	93	75	18	37	12.1	10.0	82.6	225.6	144.0
25–29	170	132	112	20	38	18.4	16.1	108.3	216.9	161.2
30–34	157	105	91	14	52	22.4	20.0	100.0	349.9	228.7
35–39	128	77	62	15	51	30.9	25.8	168.2	463.6	331.3
40 and over	69	45	37	8	24	51.3	44.1	205.7	411.0	328.9
Total	689	479	401	78	210	19.1	16.4	103.3	292.6	195.6

[1] Per 10,000 births in each specified category.

The increase in puerperal fatality with age was present irrespective of outcome of pregnancy. When the infant was lost either through stillbirth or neonatal mortality, the puerperal fatality rate for the youngest mothers was considerably lower than for mothers aged

20–24 years. However, the youngest mothers of infants surviving the neonatal period suffered puerperal fatality rates which were somewhat higher than those in the next higher age group.

Premature birth.—Table 8 presents data on premature deliveries by age of mother. Premature deliveries were least frequent among mothers aged 25–29 years (45.0 per 1,000 total deliveries). They were nearly as frequent among the youngest (72.3) as among the oldest mothers (78.4). The rate for combined infant loss was also relatively high when the mother was under 20 years of age, both among full-term and among premature births; it was at a minimum for infants of mothers aged 20–24 years. The puerperal fatality rate of the youngest mothers was extremely low in comparison to the mothers in the next higher age group when pregnancy terminated prematurely. For full-term infants the rate was the same in the first two age groups. The increase in puerperal fatality with age was relatively more rapid for premature than for full-term deliveries.

TABLE 8.—*Incidence of premature birth, combined loss of premature and full-term infants, and puerperal fatality associated with premature and full-term deliveries by age of mother, New York State (exclusive of New York City), 1936–38*

Age of mother	Deliveries		Births		Combined infant loss		Puerperal deaths associated with—		Rates				
									Incidence of premature deliveries [2]	Combined infant loss		Puerperal fatality associated with [5]—	
	Full-term	Premature	Full-term	Premature	Full-term births	Premature births	Full-term deliveries	Premature deliveries		Full-term births [3]	Premature births [4]	Full-term deliveries	Premature deliveries
Under 20	20,988	1,636	21,001	1,690	563	853	25	9	72.3	26.7	504.7	11.9	55.0
20–24	73,947	3,973	74,379	4,210	1,770	2,049	88	39	51.0	23.8	486.7	11.9	98.2
25–29	69,283	3,262	69,873	3,488	1,780	1,818	128	42	45.0	25.5	521.2	18.5	128.8
30–34	45,258	2,492	45,749	2,673	1,411	1,475	115	40	52.2	30.8	551.8	25.4	160.5
35–39	23,980	1,617	24,268	1,722	979	1,013	85	42	63.2	40.3	588.3	35.4	259.7
40 and over	8,513	724	8,602	756	499	474	46	22	78.4	58.0	627.0	54.0	303.9
Not stated	31	23	31	23	22	21	------	------	------	------	------	------	-----
Total	242,000	13,727	243,963	14,562	7,024	7,703	487	[1] 194	53.7	28.8	529.0	20.1	141.3

[1] There were 8 other puerperal deaths for which period of gestation was not stated.
[2] Per 1,000 total deliveries in each specified category.
[3] Per 1,000 total full-term births in each specified category.
[4] Per 1,000 total premature births in each specified category.
[5] Per 10,000 deliveries in each specified category.

ORDER OF BIRTH AND AGE OF MOTHER

The age and order of birth factors are strongly correlated. The youngest mothers are generally of lower parity and the births of high order are in most cases those to older mothers. There remains, therefore, the question as to whether the high rates of puerperal fatality and of infant loss associated with the higher orders of birth and with older mothers are related to one or the other or both of

these factors. This question may be answered by considering the variation in the rates by one of these factors when the other is held constant. Thus, for example, the variation in the rate by age of mother for first births is related to the factors associated with age alone, whereas the differences in the rate by order of birth for all mothers in a given age group are related to factors associated only with parity. This separation of the two factors is accomplished by table 9, which presents the distribution of the total births and the rates for combined infant loss and for puerperal fatality by order of birth and age of mother.

TABLE 9.—*Puerperal fatality rates (per 10,000 total deliveries) and rates of combined infant loss (per 1,000 total births) by order of birth and age of mother, New York State (exclusive of New York City), 1936–38*

Order of birth	Age of mother							
	Under 20	20–24	25–29	30–34	35–39	40 and over	Not stated	Total
	Total births (including stillbirths)							
1	18,431	41,561	24,588	9,282	2,624	459	9	96,954
2	3,725	22,853	21,179	11,084	3,884	644	5	63,974
3	522	9,231	12,228	8,823	4,090	898	2	35,794
4	59	3,428	7,071	6,170	3,647	1,017	4	21,396
5	8	1,067	4,078	4,215	2,864	965	1	13,198
6 and 7	4	408	3,351	5,101	4,208	1,819	1	14,892
8 and 9	--------	32	737	2,233	2,529	1,402	1	6,934
10 and over	--------	5	117	906	2,140	2,154	2	5,324
Not stated	2	4	12	8	4	--------	29	59
	Rates for combined infant loss [2]							
1	61.6	52.0	58.9	79.9	92.2	137.3	--------	59.8
2	60.4	42.1	39.2	47.3	63.6	77.6	--------	44.9
3	82.4	45.1	43.3	49.3	67.0	89.1	--------	49.7
4	[1] 164.2	47.5	44.1	54.6	70.2	109.1	--------	55.6
5	--------	69.4	50.8	61.4	86.6	105.7	--------	67.7
6 and 7	--------		59.4	66.8	74.9	94.0	--------	71.6
8 and 9	--------	92.1	67.8	66.3	87.0	109.8	--------	82.6
10 and over	--------		136.8	74.0	88.3	111.9	--------	96.9
	Puerperal fatality rates (per 10,000 total deliveries)							
1	16.8	21.4	27.2	57.1	95.3	174.3	--------	28.2
2	11.0	12.0	20.1	31.1	36.3	31.3	--------	19.8
3	--------	5.5	23.3	20.7	24.8	44.8	--------	18.5
4 and 5	--------	18.4	15.6	22.7	51.4	96.8	--------	20.5
6 and 7	--------	--------	33.7	24.1	43.8	78.4	--------	37.9
8 and over	--------	--------	48.1	42.5	59.3	62.9	--------	55.1
2 and over	9.5	11.0	21.3	26.5	44.4	69.5	--------	25.9

[1] Based on less than 100 births.
[2] Stillbirths and neonatal deaths per 1,000 total births.

When the rates are followed along any of the rows, the order of birth is held constant and whatever differences appear are related only to the age factor. Similarly when the rates are followed along any column, the age of mother is the same and the variation is associated with order of birth.

It may be noted that the U-shaped pattern of the curve for combined infant loss was present in all the rows as well as in all the col-

umns. For example, for births of second order the rate was high (60.4) for births to the youngest mothers, at a minimum (39.2) for infants of mothers aged 25–29, and thereafter increased with age of mother to a maximum (77.6) for infants of the oldest mothers. Again for mothers aged 25–29 years the rate for combined infant loss was high (58.9) for first births, a minimum (39.2) for second births, and thereafter increased with order of birth to a maximum (136.8) for births of the highest order.

In the case of puerperal fatality the variation in the rate was again present in every row and in every column. For mothers of the same age puerperal fatality was always higher for the primipara than for mothers who were delivered of the intermediary orders of birth, and were high again for mothers of high parity. For mothers of the same parity the rates generally increased with advancing age. For example, for mothers aged 35–39 years the puerperal fatality rate was high for first births (95.3), at a minimum for third births (24.8), and increased with higher orders of birth. Again the puerperal fatality of the primipara was at a minimum (16.8) for the youngest mothers and at a maximum (174.3) for the oldest mothers. This last group, the elderly primipara, suffered the highest puerperal fatality rates. Mothers who were over 40 years of age when they were delivered of their first child suffered a puerperal fatality rate which was ten times as high as that of the youngest primipara, and it was over twice as high as the rate of mothers in the same age group who were delivered of the highest orders of birth. The increase with age of mother for the other orders of birth was not as high as among the primipara, but it was very considerable. Thus when all the multipara were taken as a group the puerperal fatality rate increased continuously from 9.5 for the youngest mothers to 69.5 for the oldest. The variation in the rate of infant loss and of puerperal fatality by order of birth and age of mother is shown graphically in figures 3, 4, 5, and 6. Figure 3 presents the variation of the rate for combined infant loss by order of birth in the various classifications by age of mother. Figure 4 shows the differences in the rate by age of mother for the various birth orders. Similarly, figure 5 shows puerperal fatality by order of birth in the various age groups of mothers and figure 6 presents the variation of the puerperal fatality rate with age of mother for the various orders of birth.

In order to eliminate the effect of the association between survival of mother and offspring on the variation in puerperal fatality, table 10 is presented. It shows the puerperal fatality rates by order of birth and age of mother for mothers whose infants survived the first month of life.

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Figure 3.—Rates for combined infant loss (late fetal and neonatal mortality) by order of birth in the various subdivisions of the births by age of mother, New York State (exclusive of New York City), 1936–38.

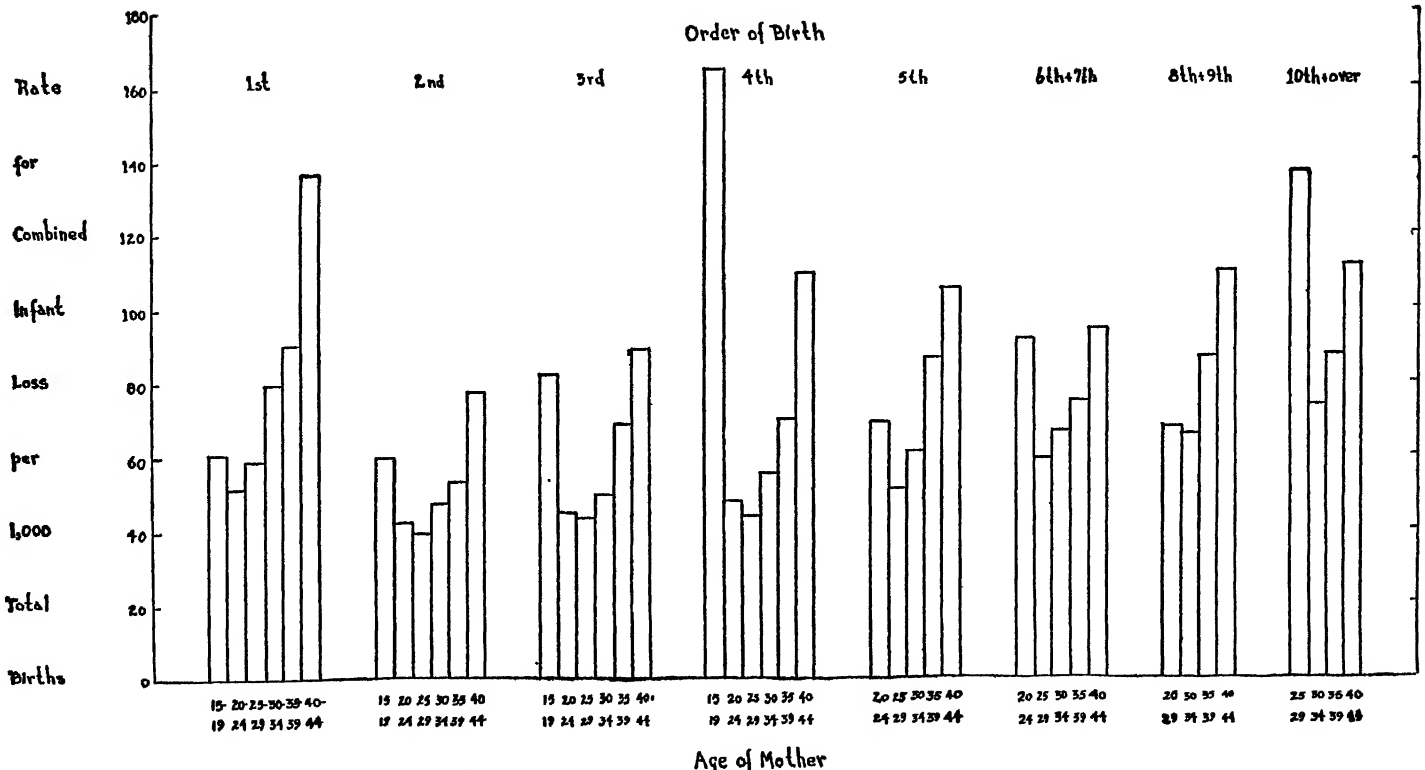

Figure 4.—Rates for combined infant loss (late fetal and neonatal mortality) by age of mother in the various subdivisions of the births by order of birth, New York State (exclusive of New York City), 1936–38.

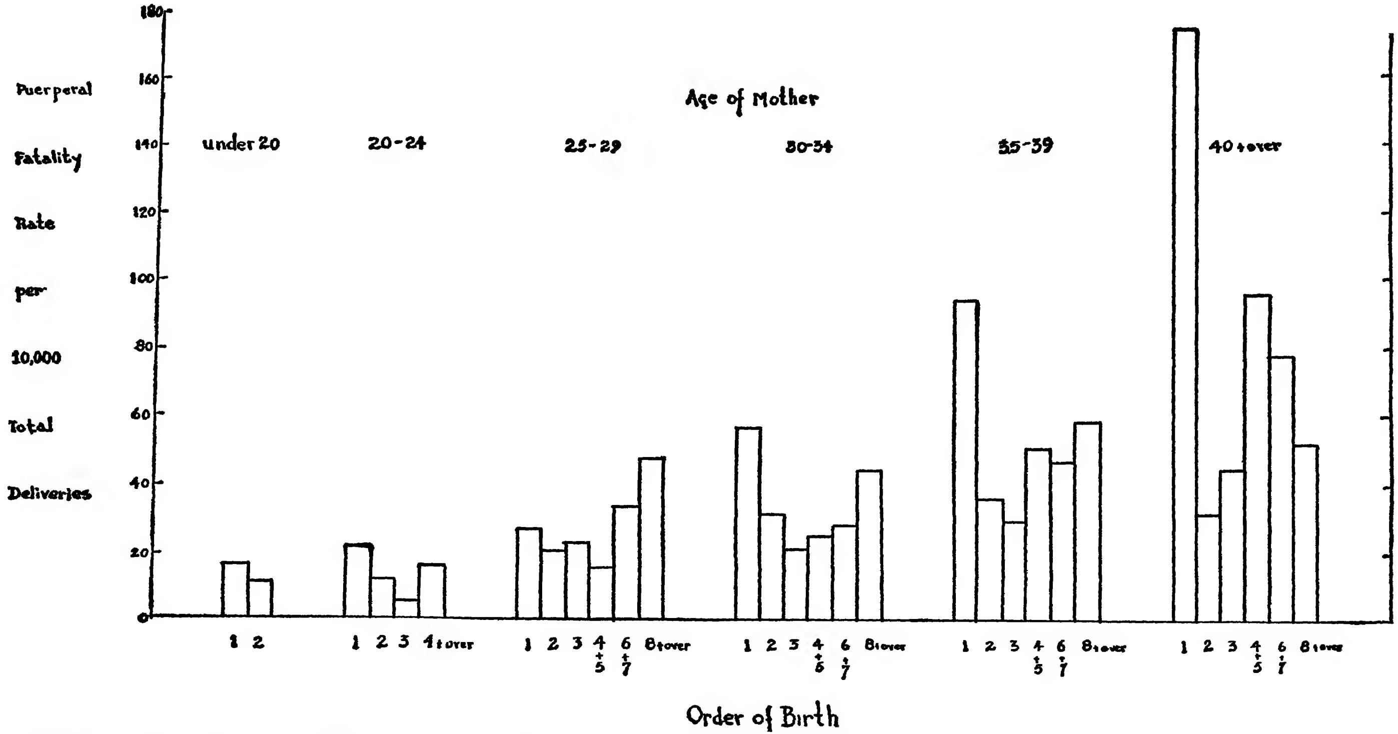

FIGURE 5.—Puerperal fatality rates by order of birth in the various subdivisions of the deliveries by age of mother, New York State (exclusive of New York City), 1936-38

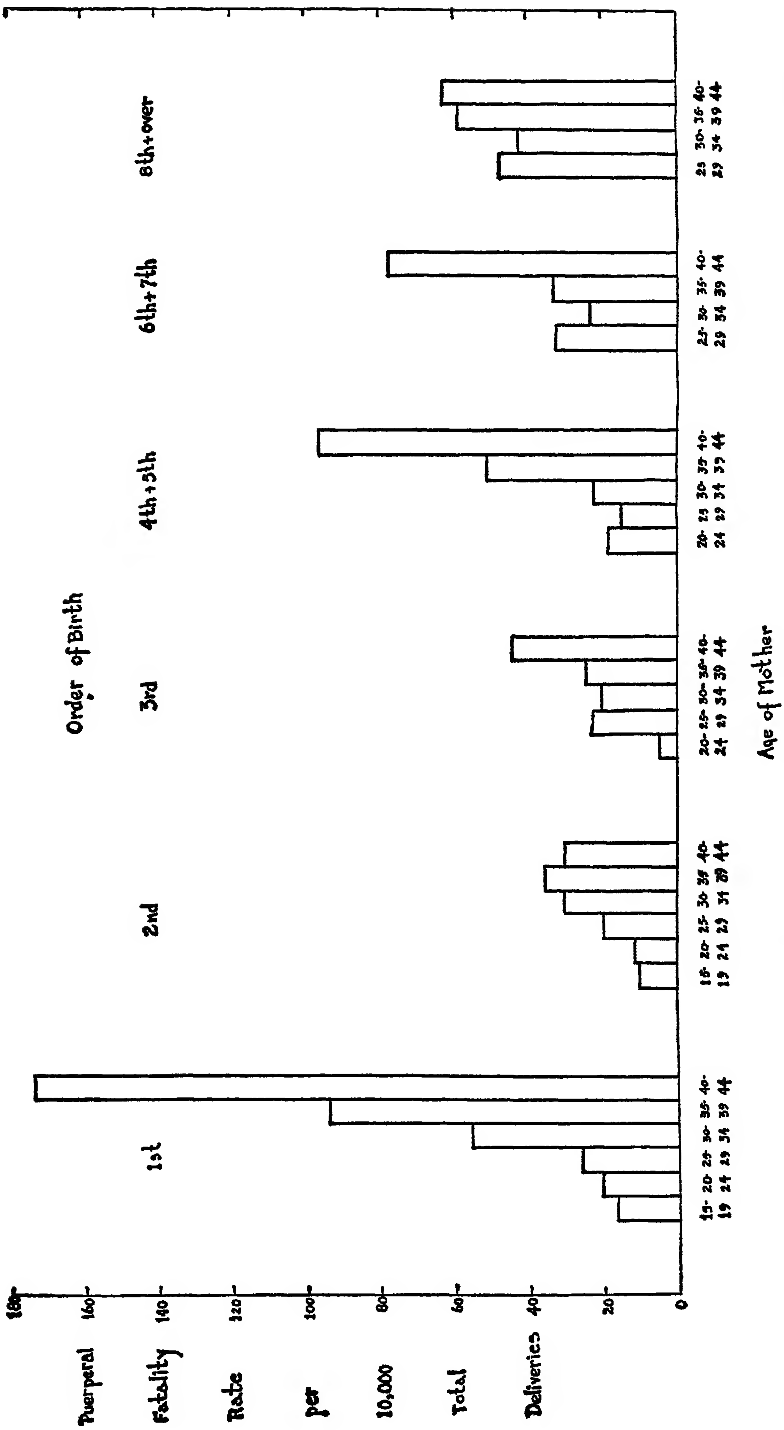

FIGURE 6.—Puerperal fatality rates by age of mother in the various subdivisions of the deliveries by order of birth, New York State (exclusive of New York City), 1936–38.

It will be noted that the trend of the rates in each row and in each column is the same as in table 9, thus indicating that the variations in puerperal fatality by age and parity are independent of the loss of offspring.

TABLE 10.—*Puerperal fatality rates (per 10,000 total births) among mothers whose infants survived the first month of life, by age and by order of birth, New York State (exclusive of New York City), 1936–38*

Order of birth	Age of mother						Total
	Under 20	20–24	25–29	30–34	35–39	40 and over	
1	12.7	12.4	20.7	41.0	54.6	101.0	18.8
2	5.7	8.2	14.3	20.7	22.0	16.8	13.3
3	----------	4.5	14.5	8.3	10.5	24.4	10.0
4 and 5	----------	7.0	11.3	13.3	25.0	67.8	16.9
6 and 7	----------	----------	15.9	10.5	25.7	48.6	20.3
8 and over	----------	----------	----------	23.9	25.8	31.6	25.1
2 and over	5.0	7.1	13.5	14.9	22.2	41.3	14.8

From the data from which the preceding tables were constructed it was also possible to determine the probability of losing (through stillbirth, neonatal mortality, and puerperal fatality) infant only, mother only, and both mother and infant.[5] These probabilities in terms of chances in 10,000 deliveries are presented in table 11 by order of birth and age of mother.

The total probability of losing the infant alone was 558.2 per 10,000 births, that of losing the mother only was 15.7, and the probability of losing both mother and infant was 11.3 per 10,000 deliveries. The variations by order of birth and by age of mother followed trends similar to the ones described above for the puerperal fatality rate and the rate for combined infant loss. The highest probabilities for losing the infant, the mother, and both mother and infant were for the elderly primipara.

AGE OF FATHER

In a previous study (*1*) it was shown that the neonatal mortality rate was related to age of father. This variation was again of the U-shaped pattern and was present in every age group of mother. A later study (*5*) based on nearly 11,000,000 births occurring in 1931–35 in the United States Birth Registration Area revealed that a similar relationship exists between the stillbirth rate and age of father. It might be implied from this relationship between age of father and survival of offspring that as men grow older there is a gradual decline in the vitality of the offspring which they produce, and that there are

[5] These probabilities were obtained directly from the frequencies. Thus the probability of losing both mother and infant was derived by dividing the number of the deliveries in which the mother died and the infant was either stillborn or died neonatally by the total number of deliveries, etc.

qualitative variations in fertility with age similar to the *quantitative* variations in fertility observed for males (*6*). It was therefore thought advisable to study the relationship between puerperal fatality and age of husband. It was reasoned that if the variations of the stillbirth and neonatal mortality rates by age of father were due *solely* to a diminution in the vitality of the fetus, then it may not be expected that any definite association exists between puerperal fatality and age of husband. However, puerperal fatality exhibited a definite relationship to age of husband, which was again of the U-shaped pattern. The variations were of lower magnitude than those found for infant loss, but they were definite.

TABLE 11.—*Probabilities (chances in 10,000 deliveries) of losing through stillbirths, neonatal deaths, and puerperal deaths, either or both mother and infant, by order of birth and age of mother, New York State (exclusive of New York City), 1936–38*

Order of birth	Age of mother						Total
	Under 20	20–24	25–29	30–34	35–39	40 and over	
	Probabilities of losing infant only						
1	611.5	510.6	581.2	780.0	876.5	1,285.4	587.5
2	598.7	417.5	386.2	460.5	620.5	760.9	441.6
3	823.8	449.6	422.8	480.6	655.3	868.6	487.8
4 and 5	1,641.7	516.1	461.0	562.3	744.9	1,039.4	588.3
6 and 7	---	921.3	575.9	652.8	729.6	912.6	697.7
8 and over	---	---	726.0	665.8	841.7	1,077.1	857.4
Total	617.6	478.8	482.4	581.3	740.7	1,005.6	558.2
	Probabilities of losing mother only						
1	11.9	11.8	19.5	37.7	49.5	87.1	17.6
2	5.5	8.0	13.8	19.8	20.7	15.7	12.8
3	---	4.4	14.2	8.1	9.9	22.4	9.7
4 and 5	---	6.9	11.0	12.8	23.4	61.1	16.2
6 and 7	---	---	15.3	10.1	24.4	44.8	19.3
8 and over	---	---	---	22.9	24.1	28.6	23.4
Total	10.6	9.6	15.4	19.1	24.2	40.1	15.7
	Probabilities of losing both mother and infant						
1	4.9	9.6	7.7	19.4	45.7	87.1	10.5
2	5.5	4.0	6.2	11.2	15.5	15.7	7.0
3	---	1.1	9.1	12.6	14.9	22.4	8.8
4 and 5	---	11.5	4.6	9.9	28.0	35.7	13.3
6 and 7	---	---	18.4	14.1	19.5	33.6	18.6
8 and over	---	---	48.1	19.6	35.1	34.3	31.7
Total	4.9	7.1	8.0	13.8	25.8	34.6	11.3

Table 12 presents the rates for combined infant loss and for puerperal fatality by the ages of both parents.[6] The variation of the rate for combined infant loss by age of father in the various subdivisions by age of mother is shown in figure 7. Similarly the variation of the stillbirth rate with age of father based on nearly 11,000,000 births in

[6] The table is based on legitimate births.

TABLE 12.—*Puerperal fatality rates per 10,000 total legitimate births and rates for combined infant loss per 1,000 total legitimate births by age of mother and age of father, New York State (exclusive of New York City), 1936–38*

Age of father	Age of mother						Total [1]
	Under 20	20–24	25–29	30–34	35–39	40 and over	
	Total legitimate births (including stillbirths)						
Under 20	1,589	431	19	2	2	----------	2,043
20–24	12,686	26,153	3,146	223	35	3	42,249
25–29	4,766	35,187	29,951	3,821	358	18	74,103
30–34	965	10,549	26,799	20,102	2,407	161	60,985
35–39	293	2,769	9,073	15,528	10,326	916	38,906
40 and over	192	1,289	3,640	8,399	12,660	8,172	34,353
	Rates for combined infant loss						
Under 20	71.7	46.4	[2] 105.3	----------	----------	----------	66.6
20–24	53.9	49.3	56.6	80.7	[2] 114.3	----------	51.5
25–29	61.7	44.8	46.4	65.7	78.2	[2] 222.2	47.9
30–34	59.1	48.0	47.0	53.0	67.3	87.0	50.3
35–39	61.4	50.9	50.0	61.3	70.9	85.2	61.0
40 and over	72.9	54.3	57.7	62.6	81.6	104.4	78.8
	Puerperal fatality rates (per 10,000 total deliveries)						
Under 20	25.3	[3] 23.3	----------	----------	----------	----------	24.6
20–24	15.1	17.0	----------	[3] 45.7	----------	----------	15.3
25–29	8.4	14.3	23.3	42.4	[3] 57.0	----------	19.2
30–34	[3] 10.4	19.1	23.0	25.7	75.8	----------	25.0
35–39	----------	25.5	26.8	31.4	38.3	[3] 132.6	33.9
40 and over	----------	7.9	36.2	48.3	53.8	70.7	52.6

[1] Includes 9 with age not stated.
[2] Based on less than 100 births.
[3] Based on less than 1,000 deliveries.

the United States Birth Registration Area, 1931–35, is reproduced from a previous paper (*5*) and shown in figure 8.

Figure 9 presents the variation in the puerperal fatality rate by age of husband in the various age groups of wife. It may be observed that both the rate of infant loss and that for puerperal fatality were generally high for young fathers, were at a minimum for fathers aged 25–34, and high again for older fathers. This variation is independent of the correlation between age of husband and wife, since it is present in nearly every age group of wife.

This relationship between puerperal fatality and age of husband is not a consequence of the association between infant loss and age of father, since the same pattern of the rates with age of husband exists also when all the mothers of stillbirths and neonatal deaths have been excluded.

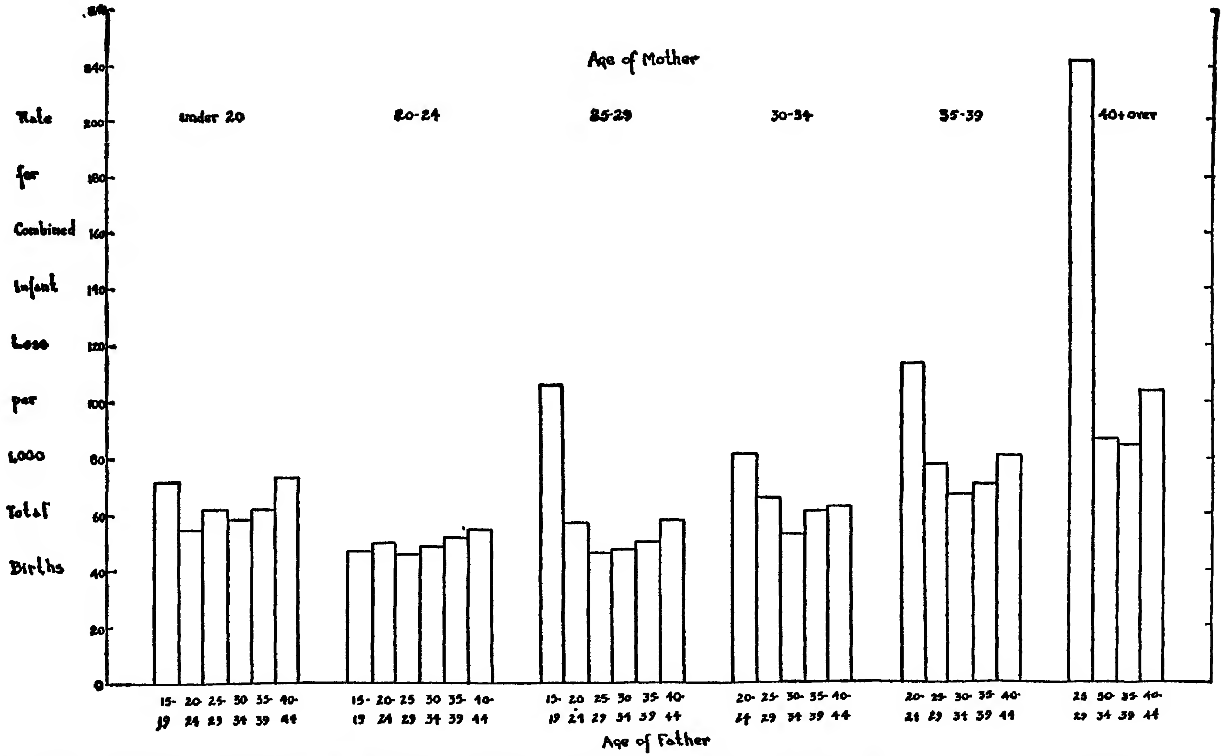

FIGURE 7.—Rates for combined infant loss (late fetal and neonatal mortality) by age of father in the various subdivisions of the births by age of mother, New York State (exclusive of New York City), 1936-38.

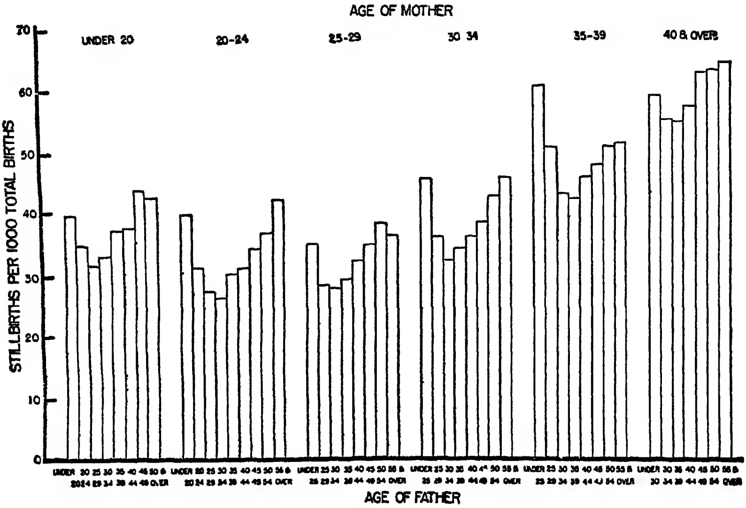

FIGURE 8.—Stillbirth rates by age of father in the various subdivisions of the births by age of mother, U. S. Birth Registration Area, 1931–35.

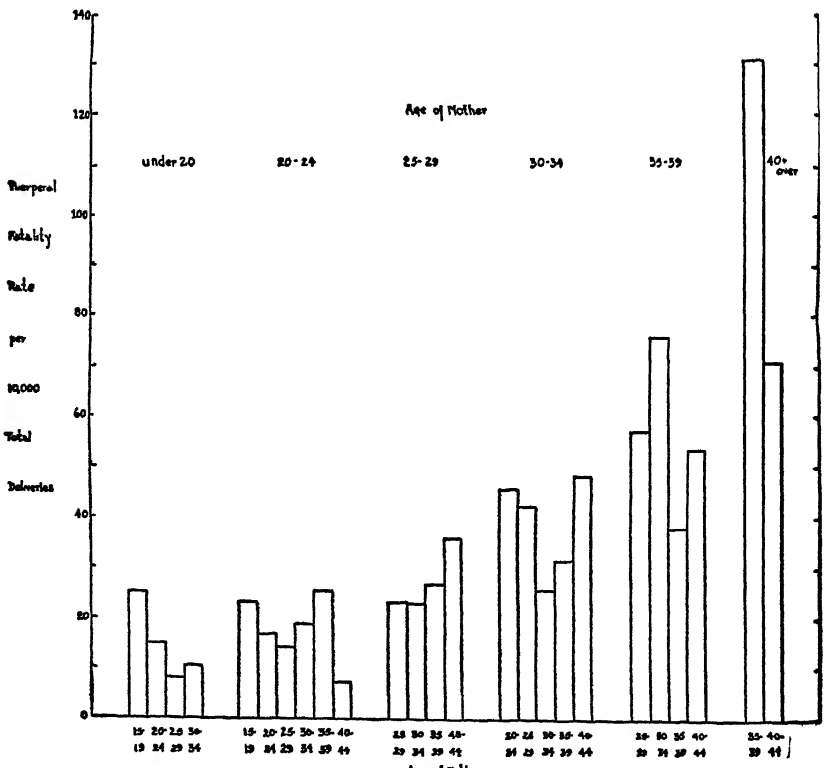

FIGURE 9.—Puerperal fatality rates by age of father (of the infant) in the various subdivisions of the births by age of mother, New York State (exclusive of New York City), 1936–38.

It is also unlikely that these variations are due to parity, since the same variation with age of husband is exhibited in puerperal fatality among primipara only.[7]

No simple explanation for the relationship between puerperal fatality and age of husband is apparent. It is difficult to see how the age of the husband could affect the mortality of his wife. This question requires much more detailed study on a much larger number of births.

SUMMARY

This is the second of a series of studies on childbirth mortality (mother and infant) based on the vital statistics records of over a quarter of a million deliveries occurring in New York State (exclusive of New York City) in the 3-year period 1936–38. The maternal death certificate was matched with the birth or stillbirth certificate of the infant. Similarly the death certificate of every infant who died under one month of age was matched with the birth certificate of the same infant. The information from each of the matched certificates was brought together on the same punch card.

Women whose death was associated with miscarriages, abortions, ectopic pregnancies, and those who died undelivered were excluded. These studies are concerned with the risk to the mother which is associated with the delivery of an offspring of viable age. The risk is defined as "puerperal fatality" and is measured by a "puerperal fatality rate" defined as the number of deaths of women who were delivered either of a live birth or of a stillbirth per 10,000 total deliveries.

This second paper deals with the relation of order of birth and age of mother to puerperal fatality and loss of offspring and records the following findings:

1. The puerperal fatality rate was high for mothers who were delivered of their first child (28.2 per 10,000 deliveries), was lowest for mothers of third births (18.5), and highest for mothers who were delivered of their eighth and ninth child (63.4).

2. The rate for combined infant loss (late fetal and neonatal mortality) was also relatively high for first births (59.8 per 1,000 total births), was at a minimum for second births (44.9), and thereafter increased with order of birth to a maximum (96.9) for births of highest orders. The relative stillbirth rates by order of birth were very similar to the relative puerperal fatality rates.

3. The increase in puerperal fatality by order of birth is not concentrated in one or two causes but embraces all causes of death.

[7] Tables separate for mothers of surviving infants and for primipara were prepared but are not presented here. It may also be desirable to construct tables by single ages rather than by 5-year age groups in order to eliminate whatever correlation there may be between the ages of husband and wife within a given 5-year age group. This, however, could not be done for technical reasons.

However, septicemia formed a smaller proportion of all deaths among the higher orders of births, while toxemias were relatively more frequent among first births and births of higher orders than among the intermediary birth orders. Deaths from hemorrhage formed a far smaller proportion of the total among primipara than among multipara.

4. The variation of puerperal fatality with parity was not a result of the association between infant loss and order of birth. The puerperal fatality increased with advancing parity also among mothers whose infants survived the first month of life.

5. Over 5 percent of the deliveries terminated prematurely. The rate for combined infant loss was 18 times as high among the premature as among the full-term infants. Puerperal fatality was 7 times as high when pregnancy terminated prematurely as when delivery was at term. The variation in the rates with order of birth was present in both the full-term and premature groups.

6. The rate for combined infant loss was relatively high for infants of the youngest mothers; it was lowest for infants of mothers in their twenties and increased thereafter with age of mother. Puerperal fatality was at a minimum for the youngest mothers and increased very sharply with advancing age of mother.

7. The puerperal fatality rate and the rate of infant loss were found to be independently related to the two factors of order of birth and age of mother.

8. The puerperal fatality rate as well as the rate for infant loss was found to be related to the age of father. The rates were relatively high when the father was young; they were lowest when the father was aged 25–34, and high again when the father was older. This variation is independent of the correlation between the ages of husband and wife. Similarly, the variation in puerperal fatality by age of husband is not an expression of the relation between age of father and infant loss.

REFERENCES

(1) Yerushalmy, J.: Neonatal mortality by order of birth and age of parents. Am. J. Hyg., 28: 244–270 (1938).

(2) Coghlan, T. A.: Childbirth in New South Wales, a study in statistics. William Applegate Gullick, Government Printer, Sydney, Australia (1899).

(3) Yerushalmy, J., Kramer, M., and Gardiner, E. M.: Studies in childbirth mortality. I. Puerperal fatality and loss of offspring. Pub. Health Rep., 55: 1010–1027 (1940).

(4) Penrose, L. S.: Maternal age and parity in placenta praevia. J. Obst. and Gynaec. Brit. Emp., 46: 645–672 (1939).

(5) Yerushalmy, J.: Age of father and survival of offspring. Human Biol., 11: 342–356 (1939).

(6) Pearl, R.: Biological factors in fertility. Annals of the Am. Assoc. of Pol. and Soc. Sci., 188: 14–25 (1936).

A RAPID THICK FILM BLOOD STAIN

By Louis Michelson, *Medical Technician*, and Aimee Wilcox, *Assistant Technologist, National Institute of Health, United States Public Health Service*

A combined Wright-Giemsa rapid staining method for blood parasites, particularly malaria parasites, is described here. This stain has the advantage of reducing thick film staining and washing time from 50 to 11 minutes. American manufactured dyes are used, thus reducing the cost of thick film staining for those who have used foreign-made dyes. The stain has been tried repeatedly on the three species of human malaria parasites in thick and thin films and on trypanosomes in the thin film with very satisfactory results. If directions are followed, it is eminently satisfactory for diagnostic purposes and quite superior to many of the Giemsa stains which are obtainable for this purpose.

A. PREPARATION OF WRIGHT-GIEMSA SOLUTION FROM GIEMSA POWDER AND WRIGHT'S SOLUTION

Place 100 cc. of glycerine, C. P., anhydrous, in a bottle of 1 liter capacity which has a tightly-fitted screw cap or stopper. Weigh accurately 1.515 gm. Giemsa powder (National Aniline Dye Co., N Ge–3) and suspend in glycerine. Fit stopper tightly, cover entire bottle neck with a double thickness of wrapping paper, and secure with large elastic bands. (These precautions are taken to prevent moisture from being absorbed by the Giemsa-glycerine mixture during the heating period in the water bath.)

Heat the bottle of Giemsa-glycerine mixture in the water bath at 55°–60° C. for 2 hours, mixing well with a glass stirring rod at half-hour intervals. At each stirring, remove bottle from water bath. After 2 hours, remove from water bath and allow to cool Then add 100 cc. of unfiltered Wright's Stain Solution (B) to the bottle of Giemsa-glycerine solution. Mix well by vigorous shaking and let stand overnight. On the next morning add 800 cc. of unfiltered Wright's Stain Solution (B) to the above mixture. Shake vigorously. Filter into a small bottle the amount of stain needed for a few days' staining. Stain requires no aging and can be used immediately.

B. PREPARATION OF WRIGHT'S STAIN SOLUTION FROM POWDER (NATIONAL ANILINE DYE CO.)

Place 1,000 cc. of methyl alcohol, acetone free, neutral, and preferably redistilled, in a bottle of 1 liter capacity which has a tightly-fitted screw cap or stopper. Weigh accurately 2 gm. Wright's powder and dissolve in the methyl alcohol. Wrap the bottle in paper and store in a dark place protected from ammonia fumes for at least 1 month.

At frequent intervals while stain is aging shake bottle vigorously. At the end of 1 month, test for staining properties. The Wright's Stain Solution must give satisfactory blood-cell staining before it can be used in the preparation of this Wright-Giemsa stain.

IMPORTANT.—All ingredients must be of reagent quality, preferably from freshly opened bottles. All glassware must be chemically clean and perfectly dry.

Rapid method for thick films:

1. Dilute stock stain 1:10 with distilled water buffered to pH 7.0. Mix well in a graduate or other container.

2. Stand blood films on end in an empty staining dish. Rapidly deliver over them enough diluted stain to reach about 1 inch above the film. Stain for 10 minutes.

3. To wash the films, first rapidly flood off the scum from the top of the stain with neutral distilled water, then remove the smears and place them in clear neutral distilled water for 1 minute.

4. Air dry and examine with oil immersion objective.

Thin films may be stained by practically the same process. However, before staining they should be fixed with methyl alcohol for 1 minute, placed on the side or end in a staining dish and the stain poured over them while the films are still wet with alcohol. This last step aids in assuring a smear which is free of precipitate and scum. For washing thin films flood off the scum from the top of stain and then dip each slide two or three times in clear neutral distilled water. Prolonged washing lessens staining detail. This method gives satisfactory results for differential blood counts.

This stain may be used by a prolonged method also for staining thick films.

1. Dilute stock stain 1:40 with neutral distilled water. Mix well.

2. Pour the stain over the slides in the staining dish. Stain for 45 minutes.

3. Flood off scum from top of stain and stand slides in neutral distilled water for *1 minute.*

4. Air dry. Examine.

Thin films may be stained by the prolonged method if the same precautions mentioned under the rapid method are observed.

LYMPHOCYTIC CHORIOMENINGITIS

GRAY MICE, *MUS MUSCULUS,* A RESERVOIR FOR THE INFECTION

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In a previous communication Armstrong and Sweet (*1*) reported two proven cases (No. 1 and No. 2) of lymphocytic choriomeningitis

which were encountered in Washington, D. C. Gray mice trapped in the homes of both patients were demonstrated to be active carriers of the virus.

The purpose of this communication is to report two additional cases of lymphocytic choriomeningitis from the District of Columbia, with recovery of the virus from gray mice trapped in each home, and to present evidence of the extent of the infection among mice trapped in the city of Washington.

CASE REPORTS

Case 3.—W. M., aged 32, roofer, had been well except for a "mild head cold" a few days prior to onset of an unremitting frontal and temporal headache on April 9, 1939. The headache became progressively more severe and he was admitted to the Gallinger Municipal Hospital on April 10, 1939, on which day he vomited twice.

The patient denied all illnesses except those of childhood.

Physical examination on admission showed a well-developed and nourished man lying in bed and holding his head in both hands. He appeared quite ill. His pulse rate was 102 and his respiration 24 per minute; systolic blood pressure was 120 mm. of mercury and diastolic 80 mm. The pupils were dilated and the neck was markedly rigid. Kernig's sign, on both sides, and Brudzinski's sign were positive. Other reflexes were generally hyperactive. Lumbar puncture on admission revealed a clear fluid under slightly increased pressure; there were 190 cells of which 50 percent were polymorphonuclear leucocytes and 50 percent lymphocytes. Successive lumbar punctures in which 15 to 25 cc. of fluid were removed at each tap revealed:

Date	*Number of cells*	*Percent lymphocytes*
April 11	210	90
April 12	293	90
April 17	500	90
April 21	375	90
April 26	80	90

The spinal fluid removed on April 11 contained protein 140 mg., chlorides 692 mg., and sugar 50 mg. percent. The colloidal gold and Kahn reactions were negative. No organisms were formed on smear or culture of any of the fluids. The patient's leucocyte count on admission was 9,800 per cubic millimeter of blood; 76 percent of the cells were polymorphonuclear leucocytes, 23 percent lymphocytes, and 1 percent monocytes. The blood Kahn was negative. The urine was normal.

The patient's temperature, which was 102° F. on admission, gradually fell and reached normal on the fifth day. The headache, stiff neck, and positive neurological signs gradually lessened and disappeared in about 10 days. He was discharged on April 28, 1939, apparently well. The patient was readmitted to Gallinger Hospital on May 5, 1939. He stated that 3 days after his discharge his headache had returned, was worse on standing, and had persisted to the time of readmission.

The physical examination, blood count, urine analysis, and spinal tap failed to reveal any abnormality. He was discharged in 6 days as improved. It was felt that his symptoms were due to a post lumbar puncture syndrome.

On September 28, 1939, he was again readmitted complaining of headache and pain in his legs and back. Physical and neurological examinations revealed no

significant findings. Fifty cc. of spinal fluid were withdrawn which showed two lymphocytes, and negative clinical, colloidal gold, and Kahn reactions. At this time it was felt that the patient's illness was due to a psychoneurosis related to his social background. There has been no further recurrence of symptoms to February 12, 1940.

A sample of spinal fluid, drawn on April 12, 1939, was iced and conveyed to the National Institute of Health where it was inoculated into 5 white mice and 1 guinea pig. All the mice developed symptoms and either died or were sacrificed on the seventh or eighth day after inoculation. The pathology was characteristic of choriomeningitis and the virus proved to be immunologically similar to our original strain of choriomeningitis virus. The guinea pig developed symptoms and its blood, drawn on the sixth day after inoculation, conveyed the infection to white mice.

The patient's spinal fluid, withdrawn on April 21 and May 2, 1939, was also inoculated into animals, but no symptoms developed and subsequent inoculation with the virus indicated a lack of immunity in the inoculated animals. The patient's serum, drawn on April 21, 1939, failed to protect mice against the virus, while a sample drawn on May 8, 1939, possessed moderate protective properties.

Case 4.—C. F., aged 27, dishwasher at a local hospital, was admitted to Emergency Hospital, Washington, D. C., on September 13, 1939, complaining of a severe persistent headache of 2 days' duration. Fever had been present for 1 day. She had vomited once on the morning of admission. There was no relevant information in her past history.

The patient was a well-developed and well-nourished colored female with an appearance of illness. Her temperature was 102.4° F., pulse rate 96, respiration 18 per minute, systolic blood pressure 100 mm. and diastolic 65 mm. of mercury. The physical examination, including neurological, was negative.

When admitted the patient's erythrocytes numbered 6,350,000 per cubic millimeter of blood. The leucocytes numbered 13,400, of which 69 percent were polymorphonuclear cells, 25 percent lymphocytes, and 2 percent monocytes. The blood Wassermann and Kahn were negative. The urine was normal.

The patient's headache persisted and her maximum temperature (rectal) varied between 98.4° and 102° F. until September 16, 1939, when it returned to normal and her headache disappeared. She felt well and her temperature was normal until the afternoon of September 18 when the headache returned and she became nauseated and vomited. The following day the headache, nausea, and vomiting were worse, the temperature rose to 101.6° F. (oral), and she appeared critically ill.

On September 20 her neck was stiff. This was the first and only positive physical finding at any time. A spinal tap performed on September 20 failed to relieve the headache. The fluid was slightly cloudy and under increased pressure. The cells, lymphocytes and large phagocytes numbered 2,070 per cubic millimeter of fluid. The globulin content was 1 plus and tryptophane test was negative. The colloidal gold reading was 12210000. The Wassermann was negative. Spinal tap on September 21 revealed a slightly turbid fluid under increased pressure. The cell count was 1,270 per cubic millimeter of fluid, all lymphocytes. No organisms were revealed by cultural or microscopic studies. On September 22 the vomiting began to subside and ceased the following day. The spinal tap was repeated on September 22; the fluid was clear and there were 1,187 cells per cubic millimeter of fluid, all lymphocytes. The sugar and chloride contents were 79 and 577.5 milligrams percent, respectively.

The temperature remained near 101° F. until September 22 when neoprontosil, 10 cc., intramuscularly every 4 hours was begun. The temperature rose from 102° to 104° F. where it remained until the medication was discontinued on September

24, 1939, after which it fell to normal within 12 hours. The headache and stiff neck gradually subsided and the patient was symptom-free on September 28, 1939.

X-ray of the chest on September 23 was normal. White blood cell counts were normal after September 6, 1939.

Agglutination tests for *Br. abortus*, *B. typhosus*, and *B. paratyphosus* A and B were all negative. She was discharged on October 10, 1939, apparently well.

The spinal fluid drawn on September 20 was delivered to the National Institute of Health where animals were inoculated. The virus of choriomeningitis was recovered in both white mice and guinea pigs. The patient's blood drawn on October 4 was moderately protective for white mice when mixed with the virus prior to inoculation. A second specimen drawn on February 13 was strongly protective.

VIRUS FOUND IN MICE FROM INFECTED HOMES

One mouse was trapped in the home of Case 3 and we were successful in isolating a strain of choriomeningitis from an emulsion of its spleen, liver, and kidney. This home was near the middle of a block of row houses from which 18 grey mice were trapped, 14 of which proved to be active carriers of the virus; infected mice were found from every home of the block where the trapping was successful.

Three gray mice were examined from the home of Case 4, 2 of which proved to be active carriers of the virus. Nine mice in all were trapped from the block of row houses wherein Case 4 lived and strains of choriomeningitis virus were recovered from 5 of them. Eight gray mice were trapped from the row of houses directly across the street from Case 4 but we were not successful in recovering virus from any of them. It thus appears that an open street is not readily traversed by gray mice.

VIRUS STUDIES ON MICE FROM HOMES HAVING NO HUMAN CASES

More than 400 mice were trapped in homes from various parts of Washington, including those above mentioned, of which 365 survived examination. Of this number 303 were submitted to the following test for the presence of virus: The mice were etherized and one kidney and a portion of the liver and spleen from each mouse were preserved in glycerin; similar portions were emulsified in buffered saline (pH 7.6) and 0.03 cc. of the emulsion was inoculated intracerebrally into 4 white mice. Where illness resulted the symptoms and time of death were recorded and a representative sample of 46 brains from ill mice were submitted to Surgeon R. D. Lillie who reported the pathological lesions of choriomeningitis as present in 44 of them. In two instances the lesions suggested secondary infections.

The final diagnosis of choriomeningitis infection was made, however, by the intracerebral inoculation of 4 normal mice and 4 mice which had been previously immunized to our original strain of choriomeningitis virus. The inoculation dose employed was 0.03 cc.

of a 1:500 suspension of mouse brain. In every instance where choriomeningitis was considered to have been recovered from the gray mice the controls died while 2 or more of the immune mice survived.

Choriomeningitis virus was recovered from 64 of a total of 303 gray mice, or approximately 1 out of every 5 mice examined from the District of Columbia was a carrier of the virus. The mice examined were trapped from 76 different homes while the infected mice came from 34 dwellings. Thus it appears that 44 percent of the mouse-infested homes studied were harboring mice infected with choriomeningitis. From these 34 infected homes a total of 122 mice was examined, 64, or 52.4 percent, of which were active carriers of the virus.

The method employed in the above studies might be criticized in that white mice were employed as an indicator of infection, since stocks of white mice have on several occasions been found to be spontaneously infected with choriomeningitis virus (*2*, *3*, *4*).

We feel that this criticism is not valid for these studies, however, for the following reasons:

1. The same strain of stock mice was employed in the study of other viruses but in no instance did we encounter choriomeningitis.

2. It was striking how mice trapped from certain homes were repeatedly found infected while from other households they were consistently negative, a situation which scarcely would have prevailed had we been dealing with a random infection of our stock mice.

3. The gray mice, in a number of instances, were found to present lesions such as a pleural exudate, fatty liver, and enlarged spleen, which enabled us to predict and later to verify the presence of the virus.

Immunity in gray mice.—In order to eliminate all possible criticism of the employment of white mice as an indicator of the presence of virus, a further test was undertaken. This study was aimed at determining the immunity of gray mice to choriomeningitis, a procedure in which white mice were not employed. Sixty-two gray mice were, therefore, trapped from 22 homes where infected mice had been found previously. These mice were next inoculated intracerebrally with 10 to 15 M. L. D. of our original strain of choriomeningitis virus. Of these 62 mice, 41 survived, while 21 died, indicating immunity in 66 percent. As a control to this group, 47 gray mice trapped in locations where only noninfected mice had been found were similarly inoculated, of which only 5, or 10.6 percent, survived, while 12 white mice, employed as additional controls, all died. The 22 homes in which mice infected with choriomeningitis were trapped, which supplied the 62 gray mice for this test, had supplied 83 mice which were previously tested for the presence of virus, of which 37, or 47 percent, were found to be carriers. The two methods are, therefore, confirmatory. The

somewhat higher immunity as compared to active infection (66:47) is what might be expected and suggests that a portion of the mice had probably freed themselves of readily demonstrable infection but retained their immunity.

SIGNIFICANCE OF CHORIOMENINGITIS IN GRAY MICE

The 4 cases of human choriomeningitis recognized in the District of Columbia during the past year were widely separated and without contact with each other. One was located in northeast, 1 in southeast, and 2 in northwest Washington, but all came from homes harboring infected gray mice.

Now, if we recall that of 76 mouse-infested homes investigated there were 34 which harbored choriomeningitis-infected mice, while 42 harbored noninfected mice, and if we recall that all 4 of our cases were associated with the group of homes harboring infected mice, it would appear that the findings are probably of statistical significance. This would appear especially probable when we consider the large but undetermined proportion of homes which harbor no mice at all and which likewise had no recognized human cases of choriomeningitis.

INFECTED MICE A PROBABLE SOURCE FOR HUMAN INFECTION

There has been no history of contact with a previous case recorded for any proven cases of choriomeningitis so far reported; neither have secondary cases been reported among contacts with any of the established cases. Thus there is a lack of epidemiological evidence pointing toward the human case as an effective source of the infection. On the other hand, several cases of the disease have developed among laboratory personnel who were associated with infected white mice (*5*, *6*, *7*). Moreover, experimental evidence indicates that normal mice are not readily infected either by feeding of the virus or by exposure in the same cage with experimentally infected mice. In view of the apparently low susceptibility of mice to such exposure, it would be remarkable if the four cases we have investigated should in every instance have infected the household mice, especially since the cases were all removed to the hospital within a few days of onset.

The wider extent of the infection among mice as compared to men in the District of Columbia also suggests mice as the reservoir of the infection. There are also certain field observations pointing in the same direction. For instance, Findlay, Alcock, and Stern (*3*) record the development of symptoms in an individual soon after he had cleaned a shed overrun by mice. Wooley, Armstrong, and Onstott (*8*), moreover, noted the relatively higher incidence of protective antibodies among persons of the lower economic stratum of society, and our four cases were all from this group. These observations are

in harmony with an assumed infection from mice, but are hard to reconcile with a person to person method of spread.

PERSISTENCE OF THE INFECTION IN MICE

As noted above, mice are not readily infected by feeding of the virus or by exposure to artificially infected mice, and when so infected tend to free themselves of the virus within a short time. On the other hand, Traub (*9*) has shown that an infected mother may convey the infection to her offspring and that such congenitally infected mice carry the infection for months. These findings have been confirmed by Haas at the National Institute of Health who has also shown that such congenitally infected mice are much more effective transmitters of the infection to other mice than are artificially inoculated animals. Our finding of 52 percent of the mice from the homes harboring infected mice to be carriers of virus, in a study extending over several months, suggests a persistent type of infection such as results from the congenital type of spread.

The evidence, therefore, strongly points to gray mice as an effective reservoir for the virus of choriomeningitis.

The method of transfer of the virus to man, however, has not been definitely established, although infection through dust or possibly by way of the gastrointestinal tract seems possible.[1]

SUMMARY

1. Two additional proven cases of choriomeningitis are reported from the District of Columbia, making a total of 4, all from homes harboring gray mice which proved to be active carriers of the virus of this disease.[2]

2. A total of 303 gray mice trapped from 76 different homes in different sections of Washington, D. C., were examined and 64 of them were found to be active carriers of choriomeningitis virus.

3. The 64 infected mice were from 34 different homes from which a total of 122 mice was examined. Thus 52 percent of the mice from these homes were harboring choriomeningitis virus.

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[1] For a more complete discussion of this phase of the subject see "Studies on choriomeningitis and poliomyelitis" by Armstrong in the Transactions and Studies of the College of Physicians of Philadelphia, April 1940.

[2] A fifth case recently reported from Lancaster, Pa., is summarized below:

Case 5. Virus infected gray mouse trapped in home of a case of choriomeningitis at Lancaster, Pa.—W. F., aged 16, patient of Dr. Gregory Sarkisian. Spinal fluid from the patient, forwarded to the National Institute of Health by Dr. Louisa E. Keasbey, pathologist, Lancaster General Hospital, on December 21, 1939, was found by animal inoculation to contain the virus of lymphocytic choriomeningitis. Blood from the patient, drawn on March 2, 1940, contained highly potent specific antibodies as demonstrated by the serum-virus protection test in white mice.

Choriomeningitis virus, immunologically identical with our original strain, was recovered from a pooled emulsion of liver, spleen, and kidney of a single mouse, *Mus musculus*, trapped in the patient's home on March 3, 1940. This is the fifth consecutive case of choriomeningitis found associated with infected gray mice in the home.

4. A total of 62 mice from 22 homes harboring infected mice were inoculated intracerebrally with 10 to 15 M. L. D. of choriomeningitis virus, of which 41, or 66 percent, proved to be immune.

5. Gray mice are believed to be an effective reservoir for the virus of choriomeningitis from which man may become infected.

REFERENCES

(1) Armstrong, Charles, and Sweet, L. K.: Lymphocytic choriomeningitis. Report of two cases with recovery of the virus from gray mice (*Mus musculus*) trapped in the two infected households. Pub. Health Rep., **54**: 673–684 (1939).
(2) Traub, E.: A filterable virus from white mice. J. Immunol., **29**: 69 (1935).
(3) Findlay, G. M., Alcock, N. S., and Stern, R. O.: The virus etiology of one form of lymphocytic meningitis. Lancet, **230**: 650–655 (1936).
(4) Lépine, P., and Sautter, V.: Existence en France du virus murine de la choriomeningite lymphocytaire. C. R. des Seances de l'Academie des Sciences, **202**: 1624–1626 (1936).
(5) Scott, T. McNair, and Rivers, T. M.: Meningitis in man caused by a filterable virus. J. Exp. Med., **63**: 397–414 (1936).
(6) Lépine, P., and Sautter, V.: Contamination de la laboratoire avec le virus de la choriomeningite lymphocytaire. Ann. Inst. Pasteur, **61**: 519–526 (1938).
(7) Unpublished case. National Institute of Health, Washington, D. C., 1939.
(8) Wooley, J. G., Armstrong, C., and Onstott, R. N.: The occurrence in the sera of man and monkeys of protective antibodies against the virus of lymphocytic choriomeningitis as determined by the serum virus protection test in mice. Pub. Health Rep., **52**: 1105–1114 (1937).
(9) Traub, E.: Factors influencing the persistence of choriomeningitis virus in the blood of mice after clinical recovery. J. Exp. Med., **68**: 229–250 (1938).

COURT DECISION ON PUBLIC HEALTH

Provision of milk ordinance prohibiting sale of milk which has had cream line increased by artificial means construed.—(Washington Supreme Court; *Arden Farms Co.* v. *City of Seattle et al.*, 99 P.2d 415; decided February 17, 1940.) The plaintiff company sold, in the city of Seattle, milk which contained 5 percent butterfat. In standardizing this milk, the company added pasteurized cream that was also homogenized so that the product was a combination of whole pasteurized milk and homogenized pasteurized cream. An ordinance of Seattle, in section 7 (m), prohibited the sale of "milk which has had the cream line increased by any artificial means," and the city health commissioner directed that the company discontinue the sale of the said 5 percent milk for the reason that the process by which the product was produced was an artificial one and that, therefore, the cream line was increased by artificial means in violation of the ordinance. Thereupon the company brought an action permanently to enjoin the city and the health commissioner from interfering with its sale of the product.

The trial court decided against the plaintiff but the supreme court reversed the decree and remanded the cause with direction to grant the relief prayed for. The appellate court said that it was plain that

the trial court disregarded the provision in the ordinance which defined homogenized milk and homogenized cream to include milk or cream which has been subjected to the mechanical process of homogenization. "Manifestly," said the court, "the trial court accepted as controlling Webster's general definition of the term 'artificial,' and incorrectly concluded that the actual process of homogenization is artificial. In sequence followed the erroneous holding that the term 'artificial' in section 7 (m) of the ordinance refers specifically to homogenized cream." The court stated that, while the dictionary defined "artificial" as "made or contrived by art; produced or modified by human skill and labor, in opposition to natural," it was patent that if the city council had desired to prevent the deepening of the cream line by the addition of homogenized cream, which is cream mechanically processed, it should have employed the word "mechanical" instead of the word "artificial." "We cannot," observed the court, "agree with the contention that as 'artificial' is that which is opposed to 'natural,' therefore, homogenized cream is 'artificial' cream, or the cream line of the milk was increased by 'artificial' means in adding to the milk homogenized cream." The view taken by the appellate court was that section 7 (m) was intended to prevent the addition of foreign substances to milk to increase its cream line and apparent richness.

DEATHS DURING WEEK ENDED JUNE 22, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 22, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,646	7,454
Average for 3 prior years	7,527	
Total deaths, first 25 weeks of year	223,854	221,984
Deaths under 1 year of age	523	454
Average for 3 prior years	476	
Deaths under 1 year of age, first 25 weeks of year	12,738	13,053
Data from industrial insurance companies:		
Policies in force	65,214,936	67,201,091
Number of death claims	11,352	12,204
Death claims per 1,000 policies in force, annual rate	9.1	9.5
Death claims per 1,000 policies, first 25 weeks of year, annual rate	10.3	11.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 29, 1940

Summary

The incidence of each of the 9 communicable diseases reported weekly by the State health officers remained low during the current week. As compared with the preceding week, increases were recorded only for meningococcus meningitis and poliomyelitis, and all except influenza were below the 5-year (1935–39) median expectancy.

The number of cases of poliomyelitis increased from 51 to 79, of which 36 cases occurred in California (15 last week), 12 in Washington State (9 last week), 5 in Wisconsin, 4 in Iowa, and 3 each in Illinois, Kansas, and Texas.

Of 17 cases of Rocky Mountain spotted fever, 11 cases were reported in the eastern States; and of 27 cases of endemic typhus fever, 8 were reported in Georgia and 6 each in Alabama and Texas.

The numbers of cases reported for the first half-year of 1940 and 1939 and the 5-year medians are as follows:

26 weeks	Diphtheria	Influenza	Measles	Meningococcus meningitis	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever	Whooping cough
1940	7,772	166,672	207,940	949	774	112,937	1,763	2,646	83,686
1939	10,227	149,475	334,515	1,173	793	110,798	8,273	3,803	101,777
5-year median	12,185	139,683	334,515	8,630	793	157,273	7,370	3,803	106,757

For the current week, the Bureau of the Census reports 7,522 deaths in 88 major cities of the United States, as compared with 7,646 for the preceding week, and with a 3-year (1937–39) average of 7,493 for the corresponding week.

The cumulative totals for the first 26 weeks of 1940 and 1939, and of the 3-year weekly averages, are as follows:

	1940	1939	Total, 3-year weekly averages
First 26 weeks	231,376	229,355	231,441

Telegraphic morbidity reports from State health officers for the week ended June 29, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39
	June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939	
NEW. ENG.												
Maine	0	1	0	-------	1	1	157	51	81	0	0	0
New Hampshire	0	0	0	-------	-------	-------	6	13	17	0	0	0
Vermont	0	0	0	-------	-------	-------	6	158	56	0	0	0
Massachusetts	1	4	5	-------	-------	-------	1,257	504	460	0	0	0
Rhode Island	0	0	1	-------	-------	-------	77	60	37	1	0	0
Connecticut	0	1	1	-------	-------	1	15	236	49	0	0	0
MID. ATL.												
New York	16	10	31	[1] 5	[1] 1	[1] 2	686	869	1,476	3	3	6
New Jersey [2]	9	5	7	6	-------	2	714	27	364	0	1	1
Pennsylvania	0	7	22	-------	-------	-------	260	85	988	1	8	8
E. NO. CEN.												
Ohio	3	22	22	11	7	7	24	58	540	1	2	2
Indiana [2]	0	9	9	3	12	8	14	10	44	0	0	1
Illinois [2]	12	24	24	18	2	8	185	28	182	0	1	1
Michigan [3]	1	9	9	-------	1	-------	728	162	218	1	0	1
Wisconsin	0	1	2	45	7	14	793	313	313	1	4	2
W. NO. CEN.												
Minnesota	4	5	3	1	1	1	61	103	103	0	0	1
Iowa	1	7	2	2	2	-------	61	64	41	0	2	2
Missouri	3	6	6	-------	-------	8	16	18	20	0	1	1
North Dakota	0	1	1	-------	-------	-------	4	9	9	0	1	0
South Dakota	0	0	0	2	-------	-------	3	23	0	0	1	0
Nebraska	1	0	1	-------	-------	-------	6	11	11	0	1	0
Kansas	3	2	2	3	-------	1	122	20	20	1	0	0
SO. ATL.												
Delaware	0	0	0	-------	-------	-------	2	2	4	0	0	0
Maryland [2] [3]	0	1	5	1	-------	-------	21	47	61	0	0	1
Dist. of Col. [2]	0	4	5	-------	-------	-------	1	77	42	1	0	0
Virginia [2] [4]	6	5	5	11	14	-------	136	115	115	3	1	4
West Virginia [3]	2	5	7	4	7	11	38	15	30	0	0	2
North Carolina [2]	1	4	9	-------	-------	-------	57	174	134	2	3	3
South Carolina [4]	10	6	3	80	114	59	13	9	16	0	0	0
Georgia [4]	2	9	7	-------	111	-------	21	16	0	0	0	0
Florida [4]	1	5	5	-------	-------	-------	22	18	8	0	0	0
E. SO. CEN.												
Kentucky	4	3	3	5	9	3	77	2	25	3	1	5
Tennessee	3	1	3	7	2	4	21	7	14	0	0	2
Alabama [4]	6	3	5	-------	5	7	62	47	47	0	0	2
Mississippi [3] [4]	0	8	5	-------	-------	-------	-------	-------	-------	1	0	0
W. SO. CEN.												
Arkansas	2	2	4	-------	6	6	17	8	8	0	1	0
Louisiana [4]	5	4	5	10	4	7	5	18	5	0	0	1
Oklahoma	0	5	5	7	9	9	16	35	23	1	0	0
Texas [4]	9	11	20	89	32	59	245	127	100	0	1	1
MOUNTAIN												
Montana	0	0	1	-------	3	2	31	52	49	0	0	0
Idaho [2]	0	2	0	-------	-------	1	10	17	8	0	0	0
Wyoming [2]	1	0	0	-------	-------	-------	6	33	2	0	0	0
Colorado [3]	15	25	10	-------	8	-------	37	41	48	0	0	0
New Mexico	2	1	1	1	1	1	46	15	18	0	1	0
Arizona	1	2	2	30	24	9	74	8	12	0	0	1
Utah [3]	0	0	0	-------	1	-------	126	34	34	0	0	0
PACIFIC												
Washington	0	0	0	-------	-------	-------	61	540	133	1	0	1
Oregon	8	2	2	3	10	10	75	60	40	0	0	0
California	11	25	25	62	13	14	204	787	665	3	1	5
Total	143	247	290	406	407	358	6,619	5,126	6,968	24	34	61
26 weeks	7,772	10,227	12,185	166,672	149,475	139,683	207,940	334,515	334,515	949	1,173	3,630

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 29, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median 1935–39
	June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939		June 29, 1940	July 1, 1939	
NEW ENG.												
Maine	0	1	0	6	14	11	0	0	0	1	3	2
New Hampshire	0	0	0	1	0	1	0	0	0	0	0	0
Vermont	0	0	0	3	4	4	0	0	0	0	0	0
Massachusetts	0	1	1	76	60	130	0	0	0	5	2	1
Rhode Island	0	0	0	1	7	10	0	0	0	0	0	0
Connecticut	0	0	0	38	14	24	0	6	0	0	2	2
MID. ATL.												
New York	1	3	3	219	154	235	0	0	0	6	11	11
New Jersey [2]	0	0	0	108	58	58	0	0	0	4	4	4
Pennsylvania	0	0	1	133	55	241	0	0	0	13	5	13
E. NO. CEN.												
Ohio	1	1	1	82	161	152	0	7	1	15	6	8
Indiana [1]	0	0	0	21	26	37	0	7	7	0	3	3
Illinois [2]	3	2	2	263	93	183	3	14	21	6	9	9
Michigan [3]	1	2	1	104	149	149	0	2	0	3	3	4
Wisconsin	5	0	0	60	45	113	4	1	2	1	2	0
W. NO. CEN.												
Minnesota	2	0	0	25	19	49	2	3	7	0	3	0
Iowa	4	0	0	13	17	31	8	12	12	8	6	1
Missouri	0	0	0	20	27	27	5	18	11	5	13	16
North Dakota	0	0	0	6	2	5	0	0	3	1	0	0
South Dakota	0	0	0	2	15	11	1	7	4	0	0	0
Nebraska	1	0	0	8	3	8	0	1	2	2	0	0
Kansas	3	0	0	19	34	34	1	0	7	2	5	5
SO. ATL.												
Delaware	0	0	0	4	3	3	0	0	0	1	2	2
Maryland [2] [3]	0	0	0	11	6	19	0	0	0	1	1	3
Dist. of Col. [2]	1	0	0	11	2	6	0	0	0	0	0	0
Virginia [2] [4]	1	0	1	7	3	4	0	0	0	5	12	8
West Virginia [3]	0	0	0	14	12	13	0	0	0	3	11	6
North Carolina [2]	0	3	3	11	12	14	0	0	0	6	8	20
South Carolina [4]	0	29	1	2	5	1	1	1	0	6	16	20
Georgia [4]	0	4	3	1	11	6	0	0	0	13	30	30
Florida [4]	0	0	0	1	2	2	0	0	0	2	2	2
E. SO. CEN.												
Kentucky	0	0	1	26	15	15	0	0	0	9	12	13
Tennessee	0	1	1	18	12	6	1	2	1	13	15	18
Alabama [4]	0	1	5	11	15	7	4	0	0	4	7	14
Mississippi [2] [4]	1	0	0	1	1	5	0	0	0	8	7	16
W. SO. CEN.												
Arkansas	0	1	0	5	2	2	1	8	0	10	13	17
Louisiana [4]	0	0	3	5	5	6	0	0	0	15	22	21
Oklahoma	0	1	0	15	9	7	3	6	3	3	24	9
Texas [4]	3	9	2	11	18	32	0	5	2	15	21	35
MOUNTAIN												
Montana	0	1	0	6	2	9	0	2	2	0	0	1
Idaho [2]	2	0	0	2	2	2	0	0	3	1	5	3
Wyoming [2]	0	0	0	0	6	7	0	2	1	1	0	0
Colorado [5]	0	1	0	13	45	17	4	0	0	1	0	2
New Mexico	1	1	0	7	10	6	0	0	1	0	7	7
Arizona	0	1	0	3	9	7	0	2	0	1	2	4
Utah [2]	1	1	0	0	4	11	0	6	0	0	2	0
PACIFIC												
Washington	12	0	0	13	6	13	0	0	3	1	1	3
Oregon	0	0	0	2	6	20	0	0	5	5	0	2
California	36	16	7	75	97	97	0	7	7	4	8	8
Total	79	80	80	1,483	1,277	2,139	38	109	152	195	305	359
26 weeks	774	793	793	112,937	110,798	157,273	1,763	8,273	7,370	2,646	3,803	3,803

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 29, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, week ended June 29, 1940	Whooping cough, week ended July 1, 1939
NEW ENG.		
Maine	25	88
New Hampshire	2	0
Vermont	23	44
Massachusetts	144	102
Rhode Island	6	18
Connecticut	29	73
MID. ATL.		
New York	262	396
New Jersey [2]	50	299
Pennsylvania	815	816
E. NO. CEN.		
Ohio	818	834
Indiana [2]	20	80
Illinois [3]	79	802
Michigan [3]	197	208
Wisconsin	78	171
W. NO. CEN.		
Minnesota	80	35
Iowa	85	50
Missouri	0	62
North Dakota	10	7
South Dakota	12	4
Nebraska	15	5
Kansas	44	14
SO. ATL.		
Delaware	5	8
Maryland [2 3]	151	57
Dist. of Col.[3]	1	29
Virginia [2 4]	71	40
West Virginia [3]	100	21
SO. ATL.—continued		
North Carolina [2]	112	253
South Carolina [4]	24	44
Georgia [4]	13	28
Florida [4]	8	7
E. SO. CEN.		
Kentucky	61	11
Tennessee	87	104
Alabama [4]	15	55
Mississippi [3 4]		
W. SO. CEN.		
Arkansas	22	14
Louisiana [4]	83	6
Oklahoma	42	4
Texas [4]	279	194
MOUNTAIN		
Montana	1	9
Idaho [2]	25	6
Wyoming [2]	5	2
Colorado [5]	21	31
New Mexico	25	18
Arizona	34	26
Utah [3]	164	69
PACIFIC		
Washington	61	7
Oregon	25	27
California	846	126
Total	3,370	3,749
26 weeks	83,686	101,777

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended June 29, 1940, 17 cases, as follows: New Jersey, 1; Indiana, 2; Illinois, 1; Maryland, 4; District of Columbia, 1; Virginia, 1; North Carolina, 1; Idaho, 1; Wyoming, 5.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended June 29, 1940, 27 cases, as follows: Virginia, 1; South Carolina, 1; Georgia, 8; Florida, 1; Alabama, 6; Mississippi, 2; Louisiana, 2; Texas, 6.
[5] Colorado tick fever, week ended June 29, 1940, Colorado, 7 cases.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 15, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	123	39	20	3,787	384	1,213	14	377	39	1,193	--------
Current week [1]	66	25	14	3,522	294	1,036	0	344	25	1,137	--------
Maine:											
Portland	0	------	0	73	2	0	0	0	0	1	36
New Hampshire:											
Concord	0	------	0	0	0	0	0	1	0	0	8
Manchester	0	------	0	0	0	0	0	0	0	0	16
Nashua	0	------	0	0	0	0	0	0	0	0	2
Vermont:											
Barre	0	------	0	0	0	0	0	1	0	0	4
Burlington	0	------	0	1	0	0	0	0	0	4	10
Rutland	0	------	0	0	0	0	0	0	0	0	13
Massachusetts:											
Boston	0	------	1	279	10	48	0	12	2	69	206
Fall River	0	------	0	122	0	0	0	1	1	6	18
Springfield	0	------	0	7	1	4	0	0	0	6	24
Worcester	2	------	0	332	3	2	0	1	0	0	49
Rhode Island:											
Pawtucket	0	------	0	2	0	1	0	0	0	2	19
Providence	0	------	0	136	4	2	0	2	0	8	58
Connecticut:											
Bridgeport	0	------	0	1	1	0	0	2	0	1	29
Hartford	0	------	0	1	2	8	0	0	0	0	36
New Haven	0	------	0	1	0	6	0	0	0	5	24
New York:											
Buffalo	0	------	0	0	5	22	0	6	0	11	110
New York	15	1	0	546	46	223	0	74	2	97	1,443
Rochester	0	------	0	8	3	6	0	1	1	7	52
Syracuse	0	------	0	0	3	8	0	1	0	6	49
New Jersey:											
Camden	1	------	0	31	1	5	0	1	0	0	28
Newark	0	------	0	375	2	12	0	6	0	10	81
Trenton	0	------	0	0	1	5	0	5	0	0	38
Pennsylvania:											
Philadelphia	3	------	0	205	7	68	0	23	5	20	443
Pittsburgh	2	1	0	6	13	8	0	9	0	19	148
Reading	1	------	0	3	0	0	0	0	0	17	18
Scranton	0	------	--------	0	-------	1	0	-------	0	0	--------
Ohio:											
Cincinnati	2	2	0	4	7	5	0	6	0	21	117
Cleveland	0	5	1	9	9	30	0	4	0	48	158
Columbus	2	1	1	0	5	5	0	2	0	19	87
Toledo	0	1	0	3	2	20	0	3	0	21	57
Indiana:											
Anderson	1	------	0	1	1	1	0	1	0	0	13
Fort Wayne	0	------	0	4	2	3	0	0	0	6	28
Indianapolis	0	------	0	4	8	8	0	4	0	8	130
Muncie	0	------	0	1	1	0	0	0	0	2	10
South Bend	0	------	0	2	0	0	0	0	0	0	16
Terre Haute	0	------	1	0	1	0	0	0	0	0	16
Illinois:											
Alton	0	------	0	0	0	2	0	0	0	1	2
Chicago	15	2	2	151	27	317	0	37	0	84	680
Elgin	0	------	0	1	2	0	0	0	0	4	9
Moline	0	------	0	3	0	0	0	0	0	0	8
Springfield	1	1	0	1	3	0	0	0	0	4	18
Michigan:											
Detroit	1	------	0	340	12	73	0	10	1	142	248
Flint	0	------	1	2	0	8	0	0	0	1	30
Grand Rapids	0	------	0	12	1	8	0	1	0	24	30
Wisconsin:											
Kenosha	0	------	0	22	0	1	0	0	0	0	8
Madison	0	------	0	62	2	1	0	0	0	7	10
Milwaukee	0	------	0	350	2	22	0	4	0	6	93
Racine	0	------	0	11	1	2	0	0	0	0	8
Superior	1	------	0	39	0	0	0	0	0	0	6

[1] Figures for Pueblo estimated; report not received.

City reports for week ended June 15, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	4	1	3	0	0	0	0	24
Minneapolis	0	------	1	2	3	17	0	2	0	2	90
St. Paul	0	------	0	3	2	4	0	1	0	7	62
Iowa:											
Cedar Rapids	0	------	------	21	------	1	0	------	1	1	------
Davenport	0	------	------	1	------	3	0	------	0	2	------
Des Moines	0	------	0	9	0	6	1	0	0	0	22
Sioux City	0	------	------	2	------	2	0	------	0	0	------
Waterloo	3	------	------	3	------	0	0	------	0	2	------
Missouri:											
Kansas City	0	------	0	10	4	5	0	7	0	1	97
St. Joseph	0	------	0	0	2	0	0	2	0	1	20
St. Louis	1	------	0	1	9	7	0	6	0	11	201
North Dakota:											
Fargo	0	------	0	0	0	1	0	0	0	1	9
Grand Forks	0	------	------	0	------	0	0	------	0	1	------
Minot	0	------	0	0	0	0	0	0	0	0	3
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	0	------
Sioux Falls	0	------	0	0	0	2	0	0	0	0	7
Nebraska:											
Lincoln	0	------	------	4	------	3	0	------	0	2	------
Omaha	0	------	0	6	0	1	0	1	0	2	55
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	2	3
Topeka	0	------	0	20	1	0	0	1	0	2	14
Wichita	1	------	0	1	1	0	0	0	0	4	22
Delaware:											
Wilmington	0	------	0	0	5	0	0	0	0	5	36
Maryland:											
Baltimore	0	------	0	2	4	7	0	6	1	116	178
Cumberland	0	------	0	0	0	0	0	0	0	0	9
Frederick	0	------	0	0	1	0	0	0	0	0	5
Dist. of Col.:											
Washington	0	------	0	6	5	12	0	15	1	5	172
Virginia:											
Lynchburg	0	------	0	2	0	2	0	0	0	5	11
Norfolk	0	------	0	20	2	5	0	1	1	0	24
Richmond	0	------	0	2	1	2	0	1	1	4	50
Roanoke	0	------	0	22	0	0	0	0	0	1	12
West Virginia:											
Charleston	0	1	0	0	0	1	0	0	0	1	11
Huntington	2	------	------	1	------	2	0	------	0	0	------
Wheeling	0	------	0	1	1	0	0	0	0	0	20
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	1	2	0	0	0	0	0	7
Wilmington	0	------	0	0	1	1	0	0	0	0	10
Winston-Salem	1	------	0	0	0	0	0	0	0	3	18
South Carolina:											
Charleston	0	1	0	0	1	0	0	0	0	0	13
Florence	0	------	0	0	1	0	0	1	0	0	9
Greenville	0	------	0	0	2	0	0	1	0	1	19
Georgia:											
Atlanta	0	------	0	8	3	0	0	4	0	9	95
Brunswick	0	------	0	0	1	0	0	1	0	0	6
Savannah	0	------	1	1	1	0	0	1	0	0	26
Florida:											
Miami	0	------	0	3	0	0	0	1	0	0	30
Tampa	0	------	0	9	0	0	0	1	0	3	27
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	0	8	7
Covington	0	------	0	4	1	2	0	0	0	3	13
Lexington	0	------	0	40	0	0	0	0	0	10	15
Tennessee:											
Knoxville	0	------	0	5	2	3	0	2	0	0	23
Memphis	0	------	1	18	4	4	0	6	0	16	76
Nashville	0	------	1	15	3	1	0	2	0	0	43
Alabama:											
Birmingham	0	------	0	2	3	2	0	7	0	4	64
Mobile	0	------	0	1	1	0	0	0	0	0	20
Montgomery	0	------	------	0	------	0	0	------	0	2	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	2	------
Little Rock	0	------	0	0	3	1	0	3	0	1	------

City reports for week ended June 15, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
New Orleans	0	------	0	0	12	5	0	9	2	76	123
Shreveport	0	------	0	0	1	0	0	1	0	0	31
Oklahoma:											
Oklahoma City	1	------	1	0	4	1	0	0	0	0	39
Tulsa	0	------	------	0	------	0	0	------	0	9	------
Texas:											
Dallas	0	------	0	62	3	1	0	3	1	9	76
Fort Worth	1	------	0	3	2	0	0	1	0	9	25
Galveston	0	------	0	0	2	0	0	0	0	0	18
Houston	1	------	0	4	2	0	0	5	2	7	87
San Antonio	2	------	1	1	8	0	0	4	1	2	75
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	10
Great Falls	0	------	0	18	1	3	0	0	0	0	6
Helena	0	------	0	0	0	0	0	0	0	0	2
Missoula	0	------	0	0	0	0	0	0	0	0	8
Idaho:											
Boise	0	------	0	4	2	0	0	0	0	1	4
Colorado:											
Colorado Springs	0	------	0	3	0	0	0	1	0	0	10
Denver	4	------	0	11	8	6	0	3	0	1	72
Pueblo	------	------	------	------	------	------	------	------	------	------	------
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	11
Utah:											
Salt Lake City	0	------	0	106	2	2	0	2	0	72	39
Washington:											
Seattle	0	------	0	73	1	2	0	6	1	15	96
Spokane	0	------	0	1	3	3	0	0	2	3	37
Tacoma	0	------	0	2	0	4	0	0	0	0	28
Oregon:											
Portland	0	------	0	22	4	3	0	2	0	10	90
Salem	0	------	------	0	------	1	0	------	0	0	------
California:											
Los Angeles	0	8	2	11	0	21	0	15	1	87	266
Sacramento	8	------	0	4	2	0	0	2	0	24	42
San Francisco	2	2	0	6	7	8	0	12	0	40	151

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Louisiana:			
Buffalo	1	0	0	New Orleans	1	1	0
New York	1	1	0	Texas:			
Indiana:				Houston	1	0	0
Indianapolis	1	0	0	Washington:			
Illinois:				Tacoma	0	0	2
Chicago	1	0	0	California:			
Kansas:				Los Angeles	0	0	6
Wichita	0	0	1				
West Virginia:							
Huntington	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: Bridgeport, 1; New York, 3; Newark, 1.
Pellagra.—Cases: Charleston, S. C., 1; Atlanta, 4; Savannah, 5; Birmingham, 1.
Typhus fever.—Cases: New York, 1; Savannah, 1; New Orleans, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 25, 1940.—During the week ended May 25, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2	5					7
Chickenpox	1	13	7	126	300	44	9	2	96	598
Diphtheria			1	20	1	5				27
Dysentery				1	1				1	3
Influenza		1			22				26	49
Lethargic encephalitis				1	1					2
Measles		3	3	131	378	318	223	3	135	1,194
Mumps				21	301	11	10		32	375
Pneumonia		2			12	3			6	23
Poliomyelitis					1					1
Scarlet fever		6	1	159	113	14	20	18	7	338
Tuberculosis	1	8	7	44	38	1	1			100
Typhoid and paratyphoid fever				20	2	1	2			25
Whooping cough		18	22	174	104	31	29		7	385

Vital statistics—Fourth quarter 1939 and year 1939.—The Bureau of Statistics of the Dominion of Canada has published the following preliminary statistics for the fourth quarter of 1939. The rates are computed on an annual basis. There were 18.5 live births per 1,000 population during the fourth quarter of 1939 as compared with 19.3 during the fourth quarter of 1938. The death rate was 9.2 per 1,000 population for the fourth quarter of 1939 and 9.4 for the corresponding quarter of 1938. The infant mortality rate for the fourth quarter of 1939 was 59 per 1,000 live births and 63 per 1,000 live births for the same quarter of 1938. The maternal death rate was 4.2 per 1,000 live births for the fourth quarter of 1939 and 3.9 for the fourth quarter of 1938.

The accompanying tables give the numbers of births, deaths, and marriages, by Provinces, for the fourth quarter of 1939 and the year 1939, and deaths by causes in Canada for the fourth quarter of 1939, and the corresponding quarter of 1938, and for the years 1939 and 1938:

Number of births, deaths, and marriages, fourth quarter 1939

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	52,618	26,166	3,092	222	35,265
Prince Edward Island	463	278	27	3	256
Nova Scotia	2,583	1,326	152	10	1,778
New Brunswick	2,516	1,240	222	8	1,262
Quebec	18,076	7,764	1,326	79	8,371
Ontario	14,602	9,085	681	64	11,120
Manitoba	3,144	1,505	152	10	2,980
Saskatchewan	4,269	1,568	233	15	3,752
Alberta	3,928	1,461	175	21	3,180
British Columbia	3,037	1,939	124	12	2,566

[1] Exclusive of Yukon and the Northwest Territories.

Deaths by cause, fourth quarter 1939

Cause of death	Canada [1] (fourth quarter)		Province								
	1938	1939	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	506	555	5	26	32	135	233	22	29	30	43
Cancer	3,066	3,125	34	176	132	779	1,144	205	198	206	251
Cerebral hemorrhage, cerebral embolism and thrombosis	525	499	6	39	38	91	210	24	29	25	37
Diarrhea and enteritis	609	518	11	9	44	273	99	21	28	19	14
Diphtheria	144	99	------	1	6	73	1	6	9	3	------
Diseases of the arteries	2,556	2,714	18	136	111	494	1,297	165	147	137	209
Diseases of the heart	4,530	4,707	58	227	188	1,140	1,935	262	261	263	373
Homicides	21	29	------	1	2	2	5	1	5	4	9
Influenza	515	496	3	16	18	222	125	22	33	41	16
Measles	37	33	------	------	1	19	8	------	1	3	1
Nephritis	1,619	1,594	18	68	54	737	443	63	66	56	89
Pneumonia	1,922	1,527	28	88	96	445	532	79	100	68	91
Poliomyelitis	18	16	------	2	------	6	5	3	------	------	------
Puerperal causes	213	222	3	10	8	79	64	10	15	21	12
Scarlet fever	53	40	1	1	------	22	10	1	2	2	1
Smallpox	2	------	------	------	------	------	------	------	------	------	------
Suicides	217	233	1	7	6	30	87	22	17	28	35
Tuberculosis	1,407	1,308	15	85	73	590	218	85	42	53	147
Typhoid fever	51	47	------	------	2	30	4	3	7	1	------
Violence	1,023	1,065	7	58	49	232	399	69	59	69	123
Other specified causes	------	7,029	66	356	333	2,229	2,243	421	488	409	484
Unspecified or ill-defined causes	------	144	2	5	40	57	16	5	5	12	2
Whooping cough	105	166	2	15	7	79	7	16	27	11	2

[1] Exclusive of Yukon and the Northwest Territories.

Number of births, deaths, and marriages, year 1939

Province	Live births	Deaths (exclusive of still-births)	Deaths under 1 year of age	Maternal deaths	Marriages
Canada [1]	228,621	108,739	13,891	965	103,567
Prince Edward Island	2,105	1,115	166	17	638
Nova Scotia	11,700	6,273	751	48	4,994
New Brunswick	11,228	5,064	885	54	3,722
Quebec	79,503	33,376	6,209	368	28,899
Ontario	63,945	37,503	2,980	276	34,657
Manitoba	13,583	6,157	752	47	7,676
Saskatchewan	17,930	5,990	915	58	7,284
Alberta	16,323	5,754	751	59	7,835
British Columbia	12,304	7,507	482	38	7,862

[1] Exclusive of Yukon and the Northwest Territories.

Deaths, by cause, year 1939, comparative

Cause of death	Canada [1]		Province								
	1938	1939	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Automobile accidents	1,545	1,580	7	82	92	390	682	63	63	81	120
Cancer	12,038	12,388	106	728	498	3,206	4,566	850	745	645	1,044
Cerebral hemorrhage, cerebral embolism and thrombosis	2,016	2,054	80	185	178	420	814	78	133	95	121
Diarrhea and enteritis	2,590	2,360	26	56	156	1,360	389	126	114	89	44
Diphtheria	434	335	------	15	83	218	13	13	36	7	------
Diseases of the arteries	9,970	10,864	78	566	429	2,108	5,185	623	527	550	798
Diseases of the heart	17,373	18,537	186	992	702	4,468	7,697	1,053	959	996	1,454
Homicides	127	122	1	6	4	16	37	4	16	13	25
Influenza	2,362	3,944	48	352	182	1,492	1,190	176	196	213	95
Measles	250	197	------	3	14	119	44	4	6	6	1
Nephritis	6,492	6,536	86	831	200	2,994	1,887	226	248	214	350
Pneumonia	7,432	6,578	102	456	406	1,970	2,171	367	377	357	372
Poliomyelitis	83	56	1	3	1	14	23	5	1	5	3
Puerperal causes	957	965	17	48	54	368	276	47	58	59	38
Scarlet fever	202	165	1	8	6	66	53	5	12	17	2
Smallpox	3	1	------	------	------	------	------	------	------	------	1
Suicides	948	973	6	85	20	153	354	84	90	102	129
Tuberculosis	6,126	5,960	61	425	286	2,680	1,084	367	232	275	550
Typhoid fever	207	180	1	3	11	109	19	16	10	7	4
Violence	4,585	4,474	81	262	190	1,073	1,637	275	269	269	468
Other specified causes	------	29,341	297	1,624	1,417	9,702	9,250	1,714	1,807	1,681	1,849
Unspecified or ill-defined causes	------	592	27	40	148	224	57	20	14	40	22
Whooping cough	496	537	3	58	37	226	75	41	47	83	17

[1] Exclusive of Yukon and the Northwest Territories.

JAMAICA

Communicable diseases—4 weeks ended June 8, 1940.—During the 4 weeks ended June 8, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	8	14	Poliomyelitis	----------	1
Diphtheria	2	3	Puerperal sepsis	----------	1
Dysentery	10	11	Tuberculosis	28	100
Leprosy	----------	3	Typhoid fever	13	51

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of June 28, 1940, pages 1188-1191. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Typhus Fever

Irish Free State—Donegal County.—During the week ended June 1, 1940, 1 case of typhus fever was reported in Donegal County, Irish Free State.

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Public Health Reports

VOLUME 55 JULY 12, 1940 NUMBER 28

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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DEVELOPMENT OF THE NATIONAL MARITIME QUARANTINE SYSTEM OF THE UNITED STATES

By Brock C. Hampton, *Division of Sanitary Reports and Statistics, United States Public Health Service*

Quarantine is one of the oldest of the general preventive measures applied for the protection of the public health. Long before man had discovered the causes of communicable disease and the manner of spread, observation and experience had led him to apply the first principle of prevention—isolation of the sick. In the Old Testament there are to be found accounts of crude application of quarantine practice in the isolation of persons afflicted with leprosy for the protection of others from the disease. These early procedures were somewhat harsh, however, as compared with modern methods, for they frequently involved banishment from a city and sometimes death for the afflicted.

The history of quarantine is closely interwoven with that of the development of commerce, public health, and preventive medicine. Official measures providing for the detention and isolation of travelers are said to have been enacted as early as the reign of the Emperor Justinian, A. D. 542, although Dr. J. M. Eager, of the United States Public Health Service, has pointed out [1] that neither the Codex of Justinian nor other official decrees of that time pertaining to the regulations of maritime matters contain anything on the subject of sanitation. In fact, in the Middle Ages, when contagious diseases became prevalent it remained for the individual city or country to make such provisions for control as it deemed necessary.

Some sort of detention procedure was employed in the Orient as early as the seventh century. Quarantine in the modern sense, however, may be said to have originated in Italy in the fourteenth century as the result of the invasion of Europe by plague from the Levant. It has been reported that from A. D. 5 to A. D. 1500, plague appeared in Europe more than sixty times, bringing terrific loss of life. These destructive visitations led the Italian cities, at that time the centers of

[1] The early history of quarantine: Origin of sanitary measures directed against yellow fever. Yellow Fever Bulletin No. 12, U. S. Public Health Service, March 1903. By J. M. Eager. An extensive bibliography of original sources, especially Latin and Italian, of early quarantine history is given by Dr. Eager at the end of his report.

commerce between Europe and the Orient, and dependent upon that trade for their prosperity, to institute the enforcement of drastic regulations to prevent the importation of plague by incoming vessels. As early as 1348 Venice had appointed commissioners of health, and her example was followed in the same year by Florence, in 1374 by Lombardy, and in 1399 by Milan.

In 1485 Venice adopted the rule that all vessels coming from infected ports should be detained for a period of 40 days, during which time they must lie in the harbor without intercourse with land or other vessels. This period of detention explains the association of the word "quarantine" with such sanitary procedure. Some historians suggest that the time limit adopted by Venice was decided upon as a penance in keeping with the ecclesiastical period of Lent. At the time of the establishment of quarantine in Venice in 1485, it is said that it was the Lenten season; and for want of a more scientific reason, for many years "quarantine" meant 40 days' detention.

With the development of the science of epidemiology and the knowedge that 40 days' detention was not necessary, the term has dropped its original temporal significance, the time depending upon the periods of incubation and communicability of the disease in question. For many years applicable specifically to the detention of infected or suspected vessels, the word "quarantine" in the modern sense applies also to restrictions imposed upon exposed persons and on commercial intercourse, by land as well as by sea, and to plants and animals, in preventing the introduction and spread of communicable diseases.

Another word of interesting quarantine history and early origin that retains a place in quarantine parlance and marks an advance toward more humane consideration of the afflicted, is "lazaretto," signifying a quarantine building or hospital for the detention of diseased persons, especially those having a contagious disease. During the periods of the crusades, leprosy became dispersed throughout Europe, resulting in the establishment of isolation stations, or "leper houses." These isolation stations were called "lazarettos," from the Italian "lazzaro," leper, and Lazarus, the beggar of the 16th chapter of St. Luke.

Although Venice may be considered the pioneer city in the establishment of quarantine, modern practice probably owes an equally large debt to Marseilles, for it was there that the first model quarantine station of the Old World was developed. One of the most important features of modern quarantine practice, and one that greatly relieves the restrictions on commerce involved in the application of quarantine measures, is the bill of health. Marseilles required that all incoming vessels be provided with a bill of health (a health pass, or "patente") filled out by a responsible official at the port of departure. This bill of health was required to give information regarding health conditions

in the countries and cities from which the ship came and of those at which she touched during the voyage. These bills of health were astonishingly modern in their nature. There were four kinds:

1. *Patente nette,* when the health of the port of departure was entirely satisfactory.

2. *Patente touchée,* when the ships came from infected ports but no cases of illness existed there at the time of departure.

3. *Patente soupconnée,* when a malignant epidemic prevailed at the port of departure or caravans had arrived there from plague areas.

4. *Patente brute,* when plague was present at the port of departure and the ship had on board merchandise from an infected port.

In addition to the bills of health, the ships themselves, the passengers, the crews, and the cargo were all subject to careful inspection.

For a long time maritime quarantine measures were directed solely against plague; and with the partial disappearance of the "Black Death" from the civilized world, regulations began to be less strictly enforced. With the appearance of yellow fever in Spain at the beginning of the nineteenth century and the arrival of cholera in Europe in 1831, and in America in 1832, there was a revival of interest in the subject and a demand for more stringent precautions, and these two diseases were made quarantinable.

The fundamental object of maritime quarantine, to prevent the introduction and spread of disease, and the fundamental purpose of the methods employed, to limit and destroy the infection, are the same now as they were in the earlier days of quarantine practice, but the procedures in use today have become rationalized through the acquisition of knowledge regarding the etiology and epidemiology of disease. Modern procedures of disinfection have developed from crude oddities of the past, such as the use of fire, exposure to air, the dew of night, and the vapors of aromatic substances called "perfumes." In early quarantine the element of time was important in the "process of purification," especially with reference to exposure to air, and that is so in quarantine practices today.

Some of the disinfection procedures employed against yellow fever in the South as recently as the beginning of the present century were no less ludicrous, nor more effective, in the light of later knowledge, than were many of the strange practices of several centuries ago. Yellow fever patients were isolated—a sound procedure, but ineffective without the control of the mosquito; but the more onerous efforts of the quarantine officers were directed at the disinfection of infected vessels by fumigation with sulfur and subjecting all articles and materials to bichloride solution. Lack of accurate scientific knowledge regarding the transmission of yellow fever was more than exceeded by the zeal and thoroughness in applying this disinfectant; and everything on board that was considered possible to be contaminated was subjected

to it—beds, bedding, furniture, pianos, and even rock ballast—much to the discomfiture and disgust of the captain of the vessel. Huge tanks of bichloride were set up on the dock or on the deck of the ship, and the solution was pumped wherever needed. It is said that even the rock ballast was sometimes dipped in the solution stone by stone, but more frequently a less tedious method was employed. At the time, such procedures and enthusiasm in applying them were commendable, but they became obsolete after Walter Reed's epochal experiments in 1900–1902.

Quarantine measures have undergone a gradual evolution in the past century, and procedures have become uniform throughout the world. Many changes have been necessary because of the development of knowledge in the sciences of medicine and sanitation, and in the etiology and epidemiology of communicable diseases. International uniformity in procedure has been brought about largely through various international sanitary conferences and the adoption of international sanitary codes by the important maritime nations of the world. The following may be considered the important principles of modern quarantine established by the international sanitary conventions:

1. Obligatory notification, between the powers, of the occurrence of quarantinable and other epidemic diseases.
2. Quarantine regulations applied only against infected areas.
3. Preventive measures carried out before the departure of a vessel from an infected port.
4. Medical inspection of individuals on board during voyage and proper treatment of suspicious cases.
5. Preventive measures at the port of entry dependent upon conditions in individual cases, such as medical inspection of passengers and crew, and inspection of vessel, statements in the bill of health, the time elapsed from time of departure and time of arrival, the occurrence of quarantinable disease on board or of suspicious cases, and similar conditions.

It is only in recent years that the quarantine system of the United States has become completely nationalized. During the greater part of our national history quarantine remained a local function, exercised by State and municipal authorities. The manner in which the Federal Government gradually assumed control and the time at which the important stations were acquired constitute an important chapter in the history of the United States Public Health Service.

The first quarantine in the American colonies of which a definite record is available was that in Massachusetts in 1647,[2] although there is some evidence for the belief that New York, under Dutch rule, made

[2] Winthrop, John: History of New England, vol. 2, p. 313. Cited by Susan Wade Peabody in Historical Study of Legislation Regarding Public Health in the States of New York and Massachusetts. J. Inf. Dis., Supp. No. 4, February 1909.

one such attempt to prevent the introduction of disease by quarantine in the same year.[2]

In both Massachusetts and New York, the first quarantine was performed upon order in council. According to Peabody,[2] "John Winthrop, in his contemporary history of those early days, tells that in 1647 there was 'a great mortality, that in Barbadoes there died six thousand, and in Christopher, of English and French, near as many, and in other islands proportionable. The report of this coming to us by a vessel which came from Fayal, the court published an order * * *.' " As this order was probably the first quarantine regulation on the North American continent, it is of interest to reproduce it here in the original wording and spelling, in full:[3]

For as much as this Court is credibly informed yt ye plague, or like greivos infectious disease, hath lately exceedgly raged in ye Barbadoes, Christophers, and other islands in ye West Indies, to ye great depopulatg of those, it is therefore ordred, yt all our own or othr vessels comeg from any pts of ye West Indies to Boston harbor shall stop and come to an anchor before they come at ye Castle, undr ye poenalty of 100£, and that no pson comeing in any vessell from the West Indies shall go a shore in any towne, village, or farme, or come within foure rods of any othr prson, but such as belongs to the vessels company yt hee or shee came in, or any wayes land or convey any goods brought in any such vessels to any towne, village, or farme aforesaid, or any othr place wthin this jurisdiction, except it be upon some island where no inhabitant resides, without licence from ye councell, or some three of them, undr ye aforesaid poenalty of a hundred pound for evry offence.

In 1699 the city of Philadelphia, with a population of about 4,000, was visited by a "pestilential fever" which raged with unusual virulence. It is said to have "carried off six, seven, and sometimes eight a day, for several weeks together, there being few if any houses free from sickness."[4] It is thought that the disease was probably yellow fever, although it was called "Barbadoes distemper" and was believed to have been brought into the colony from the West Indies. In the same year William Penn, the Proprietary of the Colony, arrived from England, his second visit after a period of absence of 15 years. During this visit Penn promulgated numerous important laws, among which was a law relating to quarantine. The occurrence of the epidemic of "Barbadoes distemper" and the prevalent opinion that it had been imported "in a ship or other sea vessel from the island of Barbadoes" gave rise to the enactment of what is probably the first quarantine law passed by a legislative assembly in this country. This act, entitled, "An Act to prevent Sickly Vessels coming into this Government," was passed at a General Assembly at New Castle in 1700. It reads as follows:[5]

Whereas, It hath been found, by sad experience, that the coming and arriving of unhealthy vessels at the ports and towns of this province and territories, and

[3] Records of the Colony of Massachusetts Bay in New England, vol. 2, p. 237. Quoted by Peabody, loc. cit., p. 41

[4] Third National Quarantine and Sanitary Convention, New York, 1859, p. 278.

[5] Third National Quarantine and Sanitary Convention, New York, 1859, p. 280.

the landing of their passengers and goods, before they have lain some time to be purified, have proved very detrimental to the health of the inhabitants of this province: *Be it therefore enacted, by the authority aforesaid,* That, from and after the publication hereof, no unhealthy or sickly vessels, coming from any unhealthy or sickly place whatsoever, shall come nearer than one mile to any of the towns or ports of this province or territories without bills of health; nor shall presume to bring to shore such vessels, nor to land such passengers or their goods at any of the said ports or places, until such time as they shall obtain a license for their landing at Philadelphia, from the Governor and Council, or from any two justices of the peace of any other port or county of this province or territories, under the penalty of ONE HUNDRED POUNDS for every such unhealthy vessel so landing, as aforesaid, to the use of the Proprietary and Governor; and that suitable provision be ordered by the Governor and Council for their reception, if they be permitted to land or come on shore.

One of the earliest records, if not the first instance, in America of the actual detention of a vessel on account of sickness, involving the application of quarantine procedure, was that of 1728, in which two "sickly" vessels arrived in the Delaware River from Bristol, England. One of the vessels, which was in "good condition," was allowed to enter, but the other, the *Dorothy*, had on board cases of "malignant fever," and it was "*Ordered*, that the *Dorothy* come not nearer than one mile to any of the towns or ports of this province," that no goods, passengers, or sailors were to be landed, and that provision be made to care for the persons sick on board.

In Massachusetts, legislation on the subject of quarantine dates back to 1701, when a law was enacted having reference particularly to smallpox, but including in its provisions protection from other diseases. In 1736 arrangement was made by the colony for acquiring Rainsford Island for a permanent quarantine establishment; and some time between 1736 and 1757 a detention hospital was built. In 1799 the responsibility for the enforcement of quarantine was transferred to the Boston Board of Health, which was established by an act of the legislature of that year.

New York was the next colony to protect her citizens against the importation of disease by regulations governing communication with infected vessels and those suspected of being infected. It was not until 1758, however, that the colonial legislature of New York enacted a quarantine law; and later, in 1784, this law was reenacted by the State legislature. This act, according to Judge Birdseye, of the New York Supreme Court, in 1856, "contains the germ of our present quarantine system; and the provision in section #3, for the appointment of a physician to inspect all vessels which may have on board, or which may be suspected of having on board, any person or persons infected with a contagious distemper, is probably the earliest provision of law in the State for the selection of a person to perform the duties of the present health officer of the port of New York."

The first provision for a health officer in New Orleans was made and quarantine activities were inaugurated in that city in 1818 in accordance with a legislative enactment entitled, "An Act to establish a Board of Health and Health Officer, and to prevent the introduction of malignant, pestilential and infectious disease into the city of New Orleans."

By 1859 several other large seaboard cities of the United States, either through municipal ordinances or by legislative enactments, had instituted quarantine regulations varying in their provisions and restrictions according to locality and opinions of the authorities under whose administration they were adopted. While such regulations differed materially in uniformity as to the time of detention of vessels, the extent of sanitary measures to be observed, and the severity of isolation, they were all modeled upon the laws previously established in other large port cities.

The lack of uniformity in quarantine procedures was soon recognized as a serious fault in the system, and conferences of boards of health and other representative organizations were called, at which not only this matter was discussed but even the very effectiveness of quarantine itself was questioned. The first conference in the United States for the discussion of a uniform system of quarantine regulation was that held in Philadelphia in 1857, attended by delegates from boards of health, boards of trade, and medical societies. Representatives from nine States on the Atlantic seaboard were in attendance. This conference was occasioned by the occurrence of yellow fever in Bay Ridge during the preceding year. Other similar conferences followed in 1858 and 1859. The following were included in the resolutions of the conference:

6. The present quarantine regulations, in operation in most of our States, are inefficient, and often prejudicial to the interests of the community.

19. With a view to procure an uniformity in Quarantine regulations throughout the several ports of the United States, the assemblying of another and probably several Conventions similar to the present one, will be required.

Nothing was actually accomplished by these conferences in the matter of securing uniform quarantine regulations. The States and cities continued to operate their own quarantine stations and to enforce their own laws until the passage by Congress of the organic quarantine act of 1893, although supplemental national quarantines, as mentioned later, were established on the Atlantic and Gulf coasts under the act of 1878.

Before 1878, however, the Federal Congress had already passed laws relating to quarantine, in 1796, 1799, 1832, and 1866, but these acts merely extended Federal aid in the enforcement of local regulations. A very early act of May 27, 1796, authorized the President to direct revenue officers and officers commanding forts to aid in the execution

of the laws of the States. This law was repealed by the act of February 25, 1799, which provided that any quarantine established by, or in conformity with the health laws of, any State should be observed by the collectors of customs and all other officers of the revenue, by masters of revenue cutters, and by military officers. An act of July 13, 1832, gave the Secretary of the Treasury authority for one year to employ additional boats and officers, if necessary, to enforce the quarantine laws of any State or the regulations made pursuant thereto. By resolution dated May 26, 1866, Congress went a little further than it had gone in previous enactments in authorizing Federal quarantine activities and planted the seed of a national quarantine system. This resolution authorized the Secretary of the Treasury "to make and enforce quarantine regulations to prevent the introduction of cholera into the country", and directed revenue officers and officers commanding revenue cutters to aid in the enforcement of such quarantine. This was an emergency measure, however, and the authority granted by it expired on the first Monday in January 1867.

These early laws were based on the assumption that quarantine was a local function, and that action by the Federal Government should be merely for the purpose of assisting State or municipal authorities, although the resolution of Congress of 1866 showed an awakening sense of Federal responsibility and marked the incipiency of a national system. An epidemic of cholera in 1873 aroused new interest in the subject of quarantine, and the Secretary of the Treasury issued a general circular the following year, on September 8, 1874, calling attention to the provisions of the act of 1799, which apparently had been neglected for some years. In this circular, officers of the Marine Hospital Service and customs officers were directed to inform themselves fully regarding local health laws and regulations and to give prompt assistance in enforcing them. The Supervising Surgeon General of the Marine Hospital Service, in his annual report for 1875, said:

> In the absence of uniformity in the regulation of quarantine upon the Atlantic and Gulf coasts, a circular letter was issued by the Hon. Secretary of the Treasury September 8, 1874, defining the duties of United States officers with reference to quarantine and the public health as provided by section 4792 of the Revised Statutes, a law which, though dating as far back as February 25, 1799, had until the past year been practically a dead letter.
>
> The several officers of the Marine Hospital Service and of the Customs were, by the circular, directed to inform themselves fully as to local health laws, and the regulations based thereon and in force at their respective ports and stations; and strict compliance with such laws, and prompt assistance in the enforcement of the same, when requested by competent authority, were enjoined under the section of the statutes above cited.
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> The immediate object of the circular was, obviously, in the direction of protection and improvement of the financial interests of the country, to prevent, so far as possible, the interruption of commercial intercourse, with the consequent

stagnation of business and loss of revenue * * *; but the applicability of the measure was broader than this, and its operation conducive to the public health * * *.

The Supervising Surgeon General went on to say that this combination of national and local effort might seem to be all that should be desired in the direction of a national system of quarantine were it not for the fact that many States had laws of arbitrary quarantine detention.

In the same annual report of the Supervising Surgeon General there appeared a letter from Dr. James S. Herron, Surgeon, in charge of the Marine Hospital patients at Pensacola, Fla, who had had some experience in quarantine matters, especially in relation to yellow fever. Dr. Herron said: "It is the almost universal opinion here that in order to make quarantines effective and equal in their operation they [quarantine activities] should all be conducted by the [Federal] Government."

In 1874 Surgeon Heber Smith[6] stated, with reference to the yellow fever epidemic of 1873, that, "so long as quarantine is a matter controlled by State caprice or fear, there is nothing to prevent the introduction of this or any other disease into a community * * *"; and in the same report Surgeon Reilly said: "In order to insure an effectual quarantine, the Surgeon in charge should be an officer of the Army, Navy, or Marine Hospital Service."

The first permanent Federal quarantine legislation was the act of April 29, 1878, entitled "An act to prevent the introduction of contagious or infectious diseases into the United States." This law directed the Surgeon General of the Marine Hospital Service to prescribe regulations relating to vessels or vehicles coming into United States ports from foreign ports or countries where any contagious or infectious disease was present, or conveying persons or merchandise affected with any infectious or contagious disease, and charged the Surgeon General with the execution of the provisions of the act. It was expressly stipulated, however, that these "rules and regulations shall not conflict with or impair any sanitary or quarantine laws or regulations of any State or municipal authorities * * *." It might seem that this provision limited the Federal regulations definitely to local laws and rules, but the Attorney General held that the law did not mean that Federal action was so limited. He stated:

The only limitation is that the Federal regulations must not interfere with the State laws * * *. Suppose the [quarantine] period named by him [the State health officer] is deemed too short. It is in my opinion clearly competent under the acts of Congress above quoted to prescribe a longer period, both for persons and

[6] Annual Report of the Marine Hospital Service, 1874.

cargo, the regulations carefully providing that the Federal jurisdiction should attach upon the expiration of State action.[7]

Under this act, officers of existing State or municipal quarantine systems, or such systems subsequently established, were authorized to act as officers or agents of the national quarantine system and were clothed with all the powers of United States officers for quarantine purposes. It was also provided that if quarantine should be considered necessary at other ports, the medical officers of the Marine Hospital Service should perform such duties in the enforcement of the quarantine rules and regulations as might be assigned to them by the Supervising Surgeon General.

The increasing necessity for the extension of powers of the Federal Government in preventing the introduction of contagious diseases into the United States and their spread from one State to another resulted in the passage of the basic act of February 15, 1893, which, with amendments thereto, is still in force and gives authority for the greater part of the present domestic and foreign (maritime) quarantine regulations. This act established a national system of quarantine designed primarily to supplement and assist the various local authorities in the establishment and enforcement of proper laws; but it also provided that State officers might surrender local stations to the Secretary of the Treasury, who was authorized to receive and pay for them if he considered them necessary to the United States for quarantine purposes; and the quarantine stations established by this act were to be used to prevent the introduction of all quarantinable diseases. It may be that the authority for a national quarantine system is contained, at least by implication and broad interpretation, in the Federal Constitution, but nationalization of quarantine was actually accomplished by allowing the States to surrender their quarantine functions from time to time as they realized the advantages of the national system. Gradually the local stations were surrendered by the States, the last two, those at New York and Baltimore, Md., having been acquired by the Federal Government in 1921.

The act of 1893 places upon the Surgeon General of the Public Health Service all duties relating to maritime quarantine and the administration of quarantine regulations. For the first time provision was made for quarantine regulations to prevent the introduction of contagious diseases other than cholera, yellow fever, smallpox, and plague. The act also provides that vessels sailing from a foreign port for any United States port must obtain a bill of health from a consular officer or from a medical officer detailed for that purpose. Authority is given for the detail of medical officers of the Public Health Service to American consulates abroad for the purpose of furnishing information and giving bills of health. The law gives the President

[7] 20 Op. Att. Gen., 474.

authority to prohibit the introduction of persons and property from such countries or places as he may designate and for such period of time as he may deem necessary.

By an act of Congress of 1891 the medical inspection of immigrants was added to the duties of the Public Health Service, and this duty has remained as an important function of the Service in assisting in the administration of the immigration laws and as an additional precaution in the prevention of the introduction of dangerous communicable diseases from abroad. An act of Congress had been passed in 1882 restricting the admission of defectives.

An act of 1917 provided for the physical and mental examination of all arriving aliens by the United States Public Health Service and the detail of medical officers of the Service to foreign countries in connection with the examination of aliens destined for the United States. Later acts have extended the provisions relating to alien seamen, bills of health, fees charged vessels at quarantine stations, and other matters.

The basic quarantine law of 1893 has been extended from time to time by amendments and by new legislation enacted for the purpose of making more effective the administration of national quarantine. An act of 1906 provided for the selection of suitable locations for and the establishment of such quarantine stations near the coast or border of the United States as may be necessary to prevent the introduction of yellow fever, and for acquiring sites by purchase or condemnation proceedings. It also authorized the examination of established State and local stations with a view to obtaining transfer by purchase or surrender of title to the Federal Government. An act of 1926 extended the quarantine laws relating to foreign commerce to include aircraft and thus brought air travel under the application of Federal quarantine laws and regulations.

Before acquiring any of the State or municipal quarantine stations, the Federal Government had established certain Atlantic and Gulf national quarantines, under the authority of the Act of 1878, the first three being those on Ship Island, near Gulfport, Miss., on Blackbeard Island, Sapelo Sound, Ga., and at Norfolk, Va., at the entrance to Chesapeake Bay. These were the first quarantine stations owned and operated by the Federal Government.

In 1879 the quarantine functions of the Marine Hospital Service were transferred by Congress to the National Board of Health, created by an act of Congress of that year, and these duties were performed by that Board until 1883, when they were turned back to the Marine Hospital Service. The National Board of Health was abolished in 1893.

The reversion of quarantine functions to the Marine Hospital Service was accompanied by the transfer of the quarantine facilities, including the property and equipment, at the three stations previously men-

tioned, the steam hospital boat *Benner* at Norfolk, Va., supplemented in the same year by the hospital steamer *John M. Woodworth*, and also some boats, barges, and disinfectant equipment on the lower Mississippi River.

The appropriation act of 1883 provided for the maintenance of Federal quarantine "at points of danger." In that year, Federal quarantine activities were undertaken at Pensacola, Fla., upon request of the Governor of the State and the Pensacola Board of Health, and were conducted in cooperation with the local board of health.

Although the method of transmission of yellow fever was not known in 1883, defensive quarantine measures in accordance with the best practice of the times was assiduously applied, and the Supervising Surgeon General stated in his annual report of that year [8] that "it may be fairly claimed for the Service that the introduction of yellow fever in the cities of the Gulf Coast has been prevented during the season since July 1, 1883, up to the date of this report, by reason of the maintenance of such quarantines."

In 1884 the Delaware Breakwater quarantine station, on Cape Henlopen at the entrance to Delaware Bay, was opened by the Federal Government, and the Norfolk station was located on leased property on Fisherman's Island, just off Cape Charles, Va. The other three stations were on Government reservations. By this year four national quarantine stations were owned and being operated by the Federal Government, and were providing sanitary defenses for the Atlantic and Gulf ports.

Federal control of quarantine seems also to have been early appreciated on the West Coast, for, during the summer of 1884, a request was made by the Governor of California for the establishment of Federal quarantine in that State. The Treasury Department offered to provide an inspector and a temporary boarding station in San Francisco Bay, as Federal funds for a complete and permanent station were not available. The authorities of San Francisco, however, while willing and ready for the establishment of a permanent station, declined the proffer of temporary assistance.

Recommendations were made by the Supervising Surgeon General in his annual reports of 1885, 1886, and 1887 for the establishment of a quarantine station on the Pacific Coast, in San Francisco Bay, for which a suitable site was selected, in 1886, on a portion of the Government reservation on Angel Island. In 1888 Congress authorized and made appropriation for the construction of quarantine stations at San Diego and San Francisco, Calif., and at Port Townsend, Wash.

Operation of the San Diego (Calif.) and Port Townsend (Wash.) Federal quarantine stations was begun in 1889, and in that year

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[8] Annual Report of the Marine Hospital Service, 1883, p. 47.

construction had commenced on the buildings at the San Francisco station, and an appropriation of $30,000 had been made for a boarding steamer at the latter station.

The national quarantine station which operated for a time on one of the Dry Tortugas, off the southwest coast of Florida, has an interesting though comparatively brief history which merits special comment. In the summer of 1887 an epidemic of yellow fever occurred at Key West, Fla. In January of that year the Marine Hospital Service had recommended the establishment of a national quarantine station at or near Key West, with adequate facilities for handling infected vessels for the protection not only of Key West but of the entire southern coast and the inland States as well. On this recommendation a bill to provide such a station was introduced in the Senate on February 22, 1887, but was not reported out by the Committee to which it was referred. In the following year, on August 1, 1888, an act was passed authorizing the establishment of the station and appropriating $88,000 for the purpose. By permission of the Secretary of War, in 1889, the station was located on Garden Key, one of the Dry Tortugas group of small coral islands, about 10 acres in area and approximately 65 miles west of Key West.

A large part of this Key was, and still is, occupied by Fort Jefferson, formerly an Army post, of especial historical interest because Dr. Samuel A. Mudd was imprisoned here between 1865 and 1869, after his conviction and sentence to life imprisonment by a military commission for surgical services given John Wilkes Booth, the assassin of President Lincoln, and alleged complicity in his attempted escape. During a yellow fever outbreak on the island in 1867, Doctor Mudd volunteered to serve as fort physician and gave heroic service, exposing himself to every possible risk. He contracted the disease and narrowly escaped death. For these services he was pardoned in 1869 by President Johnson.

The station on the Dry Tortugas, for a long time called the Key West quarantine station, was opened early in 1889, and for 11 years was the main reliance of the Marine Hospital Service for the treatment of infected vessels along the southern coast from Brunswick, Ga., to Mobile, Ala. Early in 1900 the islands in this group were transferred by Executive Order to the Navy Department for use as a naval base and coaling station, but on strong representation by the Surgeon General of the Marine Hospital Service regarding the need for the station during the approaching summer season, permission was expressly given in the Naval Appropriation Act for the fiscal year 1901 for it to continue operating until the end of the "quarantine close season," November 1, 1900. The same act provided an appropriation of $125,000 for the establishment of national quarantine stations on

Fleming Key, approximately one-half mile north of Key West, and on Mullet Key, in Tampa Bay. The latter station was later constructed. The situation regarding South Atlantic and Gulf quarantine was further relieved in 1901, when the Florida State quarantine stations were turned by the State over to the Federal Government.

By Presidential proclamation dated January 4, 1935, the Dry Tortugas group of keys was included in the Fort Jefferson National Monument "for the preservation of Fort Jefferson and the historic and educational interest contained in such area."

By 1892 Federal quarantine activities were being conducted at eight national maritime quarantine stations, namely, Cape Charles, Va., Delaware Breakwater, Del., Blackbeard Island, Ga., Key West (Dry Tortugas), Fla., Chandeleur Island (transferred from Ship Island in 1889), near Biloxi, Miss., San Diego and San Francisco, Calif., and Port Townsend, Wash.

In the following years other Federal quarantine stations were added, either through acquisition of State and local stations or through original establishment. By 1919 the Federal Government was in administrative charge of all maritime quarantine in the United States and territorial and insular possessions, with the exception of a few small stations administered by the Texas State quarantine service. These latter stations were acquired in 1920, although actual title did not pass until later.[9]

The administration of some of the larger eastern quarantine stations was turned over to Federal control by the respective States or cities several years prior to transfer of title to sites and physical properties. In most instances these were acquired by the Federal Government through purchase.

The New Orleans station near the mouth of the Mississippi passed from State to Federal control by purchase in 1907, though transfer of title was not completed until 1909. The quarantine functions of the Boston station were transferred from local to Federal administration in 1915, while title was not acquired until 1917. The New York City quarantine station was administered for several years by a Public Health Service officer, appointed by the Governor of the State, but was not actually acquired by the Federal Government until 1921. The Public Health Service assumed control and operation of the Baltimore station through lease in 1918, and it was purchased by the Federal Government in 1921.

The nationalization of maritime quarantine has thus been achieved by the voluntary surrender to the Federal Government of quarantine

[9] Annual Report of the Surgeon General, U. S. Public Health Service, 1920 (pp 125, 126), and subsequent years.

FIGURE 1 —Quarters for officers and attendants, office, kitchen, and dining room for the Dry Tortugas Quarantine Station The walk is bordered by cannon balls (Photograph taken about 1887)

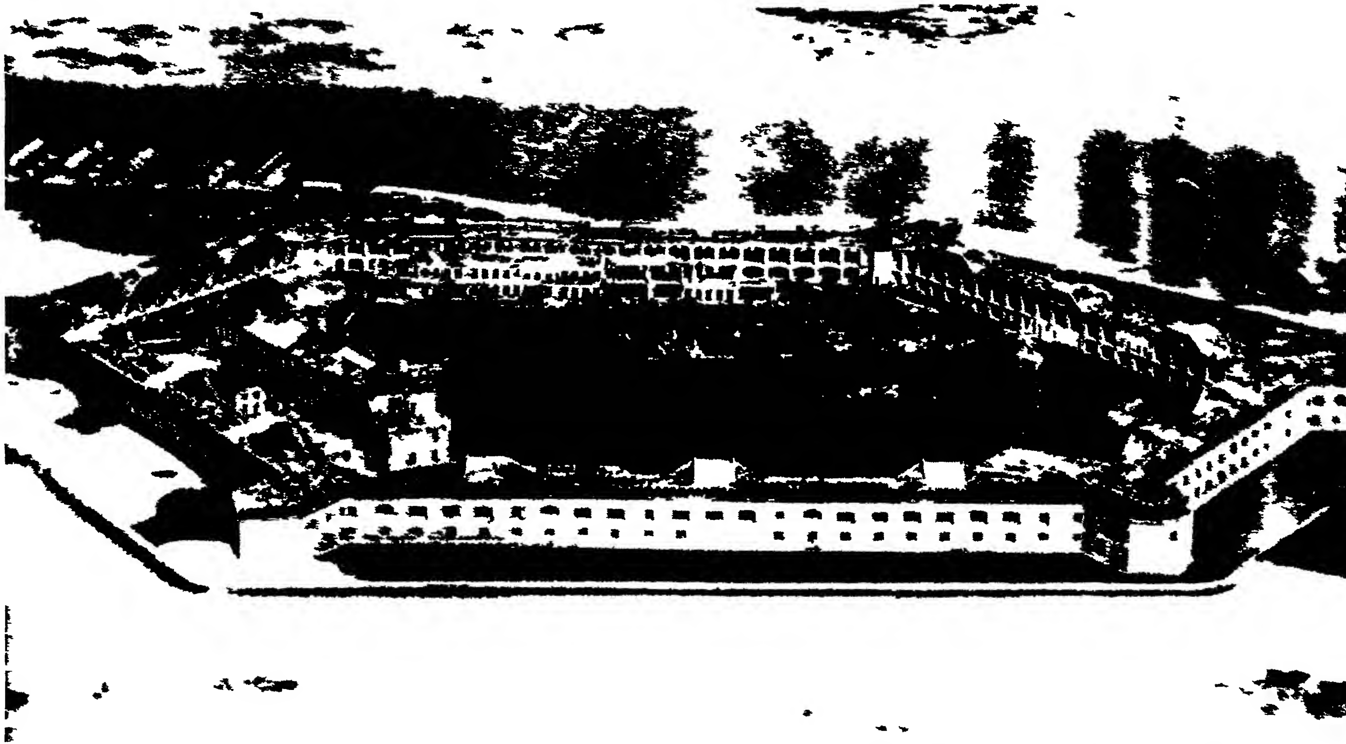

FIGURE 2.—Old Fort Jefferson as it looks today showing moat partly filled by sand which has drifted in through breaks in the sea wall

activities and stations first established by the States and cities and by original Federal establishment. For a time a confusing tri-power system obtained, in which the quarantine functions were performed by city, State, and Federal governments. It was soon realized, however, that national quarantine was essentially a national function and that the Federal Government could best develop and maintain uniform and standardized procedures.

In recent years the United States Public Health Service has made considerable progress in improving and modernizing both stations and floating equipment, has acquired many new and more convenient sites for stations, and has replaced old buildings with modern construction, while other stations have been improved by repairs and additions to buildings. As the result of lessened danger of the importation of disease owing to improved conditions of maritime shipping and international sanitary conventions, and in consequence of expanded facilities at large key stations centrally situated with respect to port areas from which fumigation apparatus and crews may be rapidly and promptly dispatched, the fumigation and detention facilities are being abandoned at certain small stations where the necessity for these quarantine procedures is infrequent.

By 1940 the Federal Government, through the United States Public Health Service, was conducting quarantine activities at 52 ports in continental United States, 33 stations in territorial and insular possessions, at 41 airports of entry, in the Panama Canal Zone, and at 17 border stations. In addition, quarantine functions were being performed at other stations and at 41 American consulates in foreign countries in connection with immigration activities.

The floating equipment used in connection with maritime quarantine consists of approximately 50 quarantine vessels ranging in size from 100-foot Diesel-electric cutters to 40-foot gasoline and Diesel-driven launches.

On February 1, 1937, an important advance in quarantine procedure was made by the adoption of "radio pratique" at the port of New York, and for the first time in the history of quarantine in the United States passenger vessels from a foreign port passed quarantine without stopping for inspection. By this procedure permission to enter and dock is granted by radio to a certain class of vessels which, because of their known safe health status, are not required to undergo inspection at the quarantine station. It is believed that the plan for radio pratique adopted by the Public Health Service offers the maximum of safety to our ports while imposing the minimum burden of

expense on shipping incident to delay at quarantine. It has now been extended to four other ports in the United States, Boston, Mass., Miami, Fla., San Francisco and Los Angeles, Calif.

The increase in international airplane travel in recent years has created a new danger from imported disease that is of especial importance. The rapidity of such means of transportation brings the flight time from infected areas within the incubation period of certain quarantinable diseases, especially yellow fever and possibly Asiatic cholera. Airplanes may also bring infected mosquitoes into this country unless preventive measures are applied. It has been found necessary, therefore, to adopt and apply quarantine measures with respect to air traffic, especially that from South America and the Orient. In 1935 the Government of the United States became signatory to an international sanitary convention regarding aerial navigation, similar to the international sanitary conventions governing travel by land and sea.

Quarantine protective measures do not relate exclusively to persons, animals, and insects. Dangerous communicable diseases may also be imported by bacteria cultures and infected plants, and cases of anthrax occurring in the United States have been traced to the use of shaving brushes of foreign origin which carried the spores of infection. Under authority of an Executive Order in 1930, quarantine regulations were promulgated governing the importation of birds of the parrot family to prevent the introduction of psittacosis. In 1938 protective regulations were adopted governing the importation of bacteria, viruses, and other organisms or agents that cause disease, and of living insects, animals, or plants new or not widely prevalent in the United States and capable of carrying or transmitting any contagious or infectious disease.[10] And in 1939 existing quarantine regulations were amended to provide stricter control over the importation of shaving brushes designed to give greater protection against the danger from the introduction of anthrax infection.

The important quarantine and associated work of the Public Health Service at the present time includes medical inspection of vessels, passengers, and seamen, and of airplanes, crews, and passengers arriving at ports in this country and its insular possessions, medical examination of intending immigrants at ports of departure, medical examination of alien passengers and seamen under the immigration laws, the institution of isolation and detention measures when necessary, and the fumigation of vessels. As a result of the application of these protective measures, in recent years there has been

[10] The Department of Agriculture administers the plant quarantine act passed in 1912 to prevent the introduction and spread of plant diseases and destructive insects.

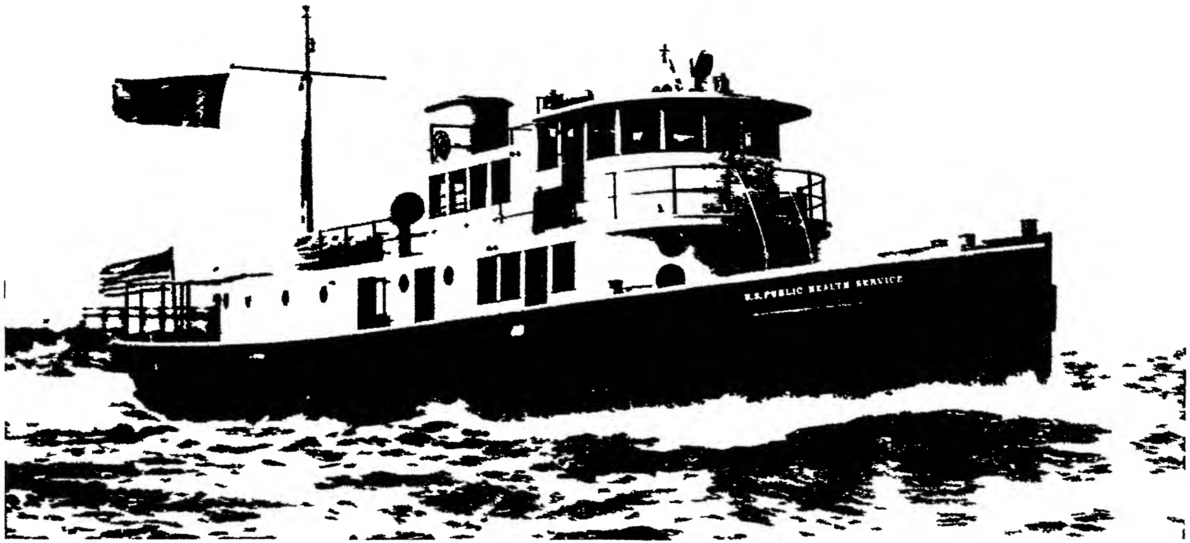

FIGURE 3—A 100 ft Diesel electric boarding vessel 0 h p speed 12 knots used at the New York Quarantine Station

GURE 4.—A 60 ft twin screw Diesel boarding vessel, 350 h p , speed 12 knots, used in southern waters for ship-to shore service, removing disabled or sick seamen from ships not entering port

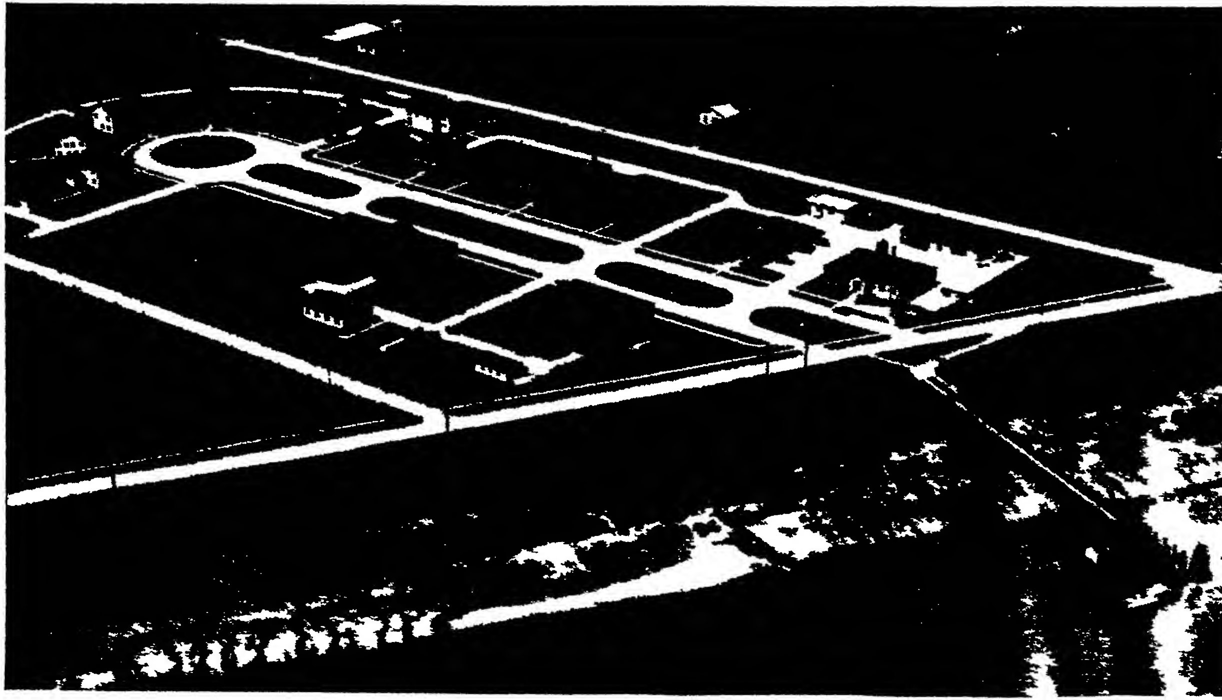

FIGURE 5 —The U S Public Health Service Quarantine Station in New Orleans La

FIGURE 6.—Passengers arriving in the United States by airplane are examined to prevent the introduction of quarantinable disease

no instance of the importation into the United States of any quarantinable disease. Frequently vessels have arrived at quarantine stations with a quarantinable disease on board, but effective measures taken at these stations by the medical officers of the Public Health Service have prevented the disease from spreading into the United States. It is well within the memory of the older officers of the Public Health Service, however, that conditions were quite different, when the lines of defense against the importation of dangerous diseases were less tightly drawn, when the quarantine regulations of the States and cities lacked uniformity in requirements and in enforcement, and when, because of the lack of an effective barrier, cholera, plague, smallpox, and yellow fever constituted a constant menace to the public health of the United States.

Although recent years have witnessed great changes in the concepts of the functions of public health services and unparalleled advances in public health methods and administration as a result of the expansion in the fields of activity designed to provide greater national health protection, the prevention of the importation of disease is still an important function of a national public health service. While the danger of importing disease has been greatly lessened by various factors of modern life, such as increase in our knowledge of prevention of disease, facilities for obtaining prompt information regarding the world prevalence of disease, improvement in the sanitary condition of vessels, increase in the number of vessels carrying ships' doctors, and the salutary effects of international sanitary conventions relating to international commerce, the continuation of the barrier of quarantine is necessary. A dangerous communicable disease may still occur in passengers or crew en route, carried aboard in the incubation period, or, with modern rapidity of transportation, it may even reach a United States port before clinical symptoms become clearly manifest; some vessels are still found rat-infested to a dangerous degree; and many vessels and airplanes come direct to our ports from areas where cholera, typhus fever, smallpox, and yellow fever prevail.

For these reasons present quarantine activities and facilities will probably not be further curtailed. In fact, more stringent measures may be required in the future as the result of disordered world conditions. In the balance of public health, prevention still outweighs cure, with respect to the introduction of disease from abroad as well as to the control of disease within our borders.

STUDIES ON DENTAL CARIES

IX. THE PREVALENCE AND INCIDENCE OF DENTAL CARIES EXPERIENCE, DENTAL CARE, AND CARIOUS DEFECTS REQUIRING TREATMENT IN HIGH SCHOOL CHILDREN [1]

By HENRY KLEIN, *Dental Officer*, and CARROLL E. PALMER, *Passed Assistant Surgeon, United States Public Health Service*

INTRODUCTION

In approaching the practical problem of providing children with effective reparative services for dental caries, it becomes of some utility to recognize that the yearly rate of development of carious defects affords a quantitative estimate of the amount of treatment required each year. Furthermore, the difference between the yearly rate of treatment and the yearly incidence of new defects may be made to serve the function of defining quantitative adequacy of dental services for caries. According to this concept, quantitatively adequate service becomes established when the annual rate of treatments coincides with the annual incidence of carious defects. It follows from this definition that the presence of unfilled but fillable carious lesions represents tangible and positive evidence of inadequate care. Likewise, devitalized teeth in the mouth and teeth extracted because of extensive caries must be interpreted in the main as evidence of the deleterious end results of inadequate service.

In a recent publication [2] the dental status of a representative grade school population was described in terms of the perspectives given above. From this study, it was shown that carious lesions arise in elementary school children at a rate approximating 1.3 affected perma-

[1] From the Division of Public Health Methods, National Institute of Health.

The preceding papers of this series are as follows:

I. Dental status and dental needs of elementary school children. By Henry Klein, C. E. Palmer, and J W. Knutson. Pub. Health Rep., 53: 751–765 (May 13, 1938).

II. The use of the normal probability curve for expressing the age distribution of eruption of the permanent teeth. By Henry Klein, C. E. Palmer, and M. Kramer. Growth, 1: 385–394 (1937).

III. The measurement of post-eruptive tooth age. By C. E. Palmer, Henry Klein, and M. Kramer. Growth, 2: 149–159 (1938).

IV. Tooth mortality in elementary school children. By J. W. Knutson and Henry Klein. Pub. Health Rep., 53: 1021–1032 (June 24, 1938).

V. Familial resemblances in the caries experience of siblings. By Henry Klein and C. E. Palmer. Pub. Health Rep., 53: 1353–1364 (Aug. 5, 1938).

VI. Caries experience and variation in the time of eruption of the teeth. By Henry Klein and C. E. Palmer. Child Development, 9: 203–218 (1938).

VII. Sex differences in dental caries experience of elementary school children. By Henry Klein and C. E. Palmer. Pub. Health Rep., 53: 1685–1690 (Sept. 23, 1938).

VIII. Relative incidence of caries in the different permanent teeth. By J. W. Knutson, Henry Klein, and C. E. Palmer. J. Am. Dent. Assoc., 25: 1923–1934 (1938).

The tenth paper of the series has also been published:

X. A procedure for the recording and statistical processing of dental examination findings. By Henry Klein and C. E. Palmer. J. of Dent. Research, 19: 243–256 (1940).

[2] Klein, Henry, and Palmer, C. E.: The dental problem of elementary school children. The Milbank Memorial Fund Quarterly, 16: 267–286 (1938).

nent tooth surfaces per child per year while the rate of placement of fillings was found to be of the order of 0.2 filled permanent tooth surfaces per child per year. This more than sixfold disparity between the incidence of need for fillings and the rate of provision of care by fillings was shown to result in the prevalence at examination of an average of 0.1 remaining roots, 0.3 nonvital and extracted permanent teeth, and more than 2.6 permanent tooth surfaces having one or more unfilled carious defects, per grade school child.

It is the purpose of the present paper to describe findings on these several aspects of the caries problem in a group of children attending high school and covering the age range from 13 to 19 years.

MATERIAL AND METHODS

Data for the present paper were derived from dental examinations of 1,841 children attending the high schools of Hagerstown, Md., and of five nearby communities.[3] The number of children examined and details of the age and sex distributions are given in table 1. The examinations, carried out by a dental officer of the United States Public Health Service,[4] were made with mirror and explorer. The observations were called out in code by the examiner to a dental assistant who recorded the information on a form especially designed to facilitate subsequent analysis of the data by punch card machine methods.[5] The records included observations on the number of teeth erupted, unerupted, missing because of extraction, having only remaining roots, with unfilled caries, filled, and/or hypoplastic. These items were noted where indicated for each of the permanent and deciduous teeth and tooth surfaces.[6] The analysis was designed to provide information on the prevalence and incidence of caries experience, dental care in the form of fillings, carious defects without evidence of fillings, and dental defects which had terminated in complete tooth destruction.

TABLE 1.—*Number of high school children examined, by specified age and sex groups*

Item specified	Age (last birthday)							
	13	14	15	16	17	18	19	All ages
Number of boys	5	142	242	193	172	74	27	855
Number of girls	15	189	268	252	183	74	5	986
Number of both sexes	20	331	510	445	355	148	32	1,841

[3] Williamsport, Boonsboro, Clearspring, Hancock, and Smithburg.

[4] Dr John F. Cody, second year dental interne.

[5] A detailed description of the methods developed for the collection and analysis of the data is given in a recent report: Klein, Henry, and Palmer, C. E.: Studies on dental caries. X. A procedure for recording and processing dental examination findings. Journal of Dental Research, 19: 243–256 (1940).

[6] Since only 88 deciduous teeth were present in the mouths of the 1,841 children, the dental findings given in the present paper concern only the permanent teeth (see appendix table).

The prevalence of caries experience in the permanent teeth is measured in each child in two ways: (*a*) By counting the number of teeth affected, and (*b*) by counting the number of tooth surfaces affected. The first of these provides a measure of the prevalence in terms of teeth, and the second, the surface count, affords a measure of the prevalence in terms of tooth surface area. The prevalence of caries experience (present and past) is defined in this paper as follows: (*a*) Teeth and tooth surfaces with open cavities, (*b*) teeth and tooth surfaces filled, (*c*) teeth with only remaining roots, and (*d*) teeth extracted. In order to convert items (*c*) and (*d*) into terms of tooth surfaces, it is necessary to assign to each tooth having only remaining roots, and each tooth, extracted a value for surfaces involved by past caries. (It is assumed that the condition of these teeth is the result of extensive caries.) Clearly a tooth having only remaining roots has been affected by the carious process on all five surfaces of the crown. In children, it is also evident that extractions usually follow total destruction of the crown surfaces. In many cases, however, tooth devitalization may be effected by penetration of the carious process into the pulp of the tooth from a single surface lesion. A proportion of such teeth form a part of those found extracted. This virulent type of caries may well be equivalent, in intensity, to attack on five separate surfaces. On the basis of these considerations, each extracted tooth and each tooth having only remaining roots is counted as five past carious surfaces. The summation of items (*a*), (*b*), (*c*), and (*d*) for the teeth or for the surfaces, designated by the abbreviation "DMF," gives information on the prevalence of caries experience in the permanent teeth and permanent tooth surfaces.

The derivation of the yearly increment or yearly incidence of each of the several aspects of the caries problem presents a somewhat more complicated task. A direct approach to the measurement of the incidence of particular morbidities (or services) can perhaps best be made through seriatim or longitudinal studies. Thus the incidence of caries experience may be determined by making dental examinations on a given date and again one year later. The number of new carious defects observed to have appeared within the interval of one year provides a measure of the incidence of caries in the group under observation. In order to obtain more representative information, it would be desirable to carry out annual examinations for several years so that average annual incidence rates might be obtained.

In the present study the yearly incidence rates are derived by indirect methods. In order to discuss the application of such methods, it is necessary to consider certain of the constituents making up the caries problem in children. The number of permanent teeth and tooth surfaces observed to be affected by past and present caries experience is constituted at a particular chronological age by all of

the carious lesions which have accumulated each year from the time of eruption of the first permanent tooth until the time of examination. For example, the total caries experience, that is, the DMF permanent teeth or surfaces observed in children 13 years of age, represent the sum total of caries occurring from about age 6 to age 13 years. The total caries experience seen in 14-year-old children is higher than that observed in 13-year-old children when the numbers of individuals being dealt with are large and representative. The difference, or the increment of caries experience, occurring between the two ages may be assumed to represent new caries taking place within the interval between the ages. Similarly, the increment of caries experience observed between any two successive age groups may be considered as new caries experience.

In those instances where caries experience distributes itself along a linear trend with age, the slope of the line fitted to the regression provides a simple averaging mechanism for deriving the value of the yearly incidence of caries. This procedure is used in the analysis of the material in the present paper. The average yearly incidence of dental care in the form of fillings, the incidence of dental defects requiring filling but remaining unfilled, and the incidence of each of the other aspects of the caries problem may be obtained by similar analytical procedures.

FINDINGS

The prevalence and incidence of accumulated caries experience.—The data presented in table 2 provide information on the prevalence of caries (DMF) experience in the high school children. As shown in this table, the total caries experience expressed in terms of the average number of DMF teeth and DMF tooth surfaces per child increases consistently with increase in chronological age. The high school children 13 years of age have an average of 4.8 permanent teeth showing evidence of caries experience, and the average 14-year-old child has 6.1 DMF teeth. At 19 years of age, each child on the average shows 9.3 DMF teeth. The DMF surfaces per child increase from 7.9 at 13 years of age to 11.4 at 14 years and 24.7 surfaces at 19 years.

TABLE 2.—*Number of decayed, missing, and filled (DMF) permanent teeth and tooth surfaces per child, by specified age groups—dental examination of 1,841 children attending the high schools of Hagerstown, Md., and of five nearby communities*

Item specified (permanent teeth)	Age (last birthday)							
	13	14	15	16	17	18	19	All ages
Number of DMF [1] teeth, per child	4.8	6 1	6 7	7.2	7.7	8.7	9 3	7.1
Number of DMF [1] surfaces, per child	7.9	11 4	13.1	14.7	16.5	19.9	24.7	14.5

[1] Decayed, missing, and filled as described in the text.

The relationship between chronological age and the average accumulated caries experience per child is shown graphically in figure 1. Inspection of the plotted points suggests, within a restricted age range covered by these data, that the two variables are related linearly. The slope of the regression line fitted to these data by the method of least squares defines with reasonable precision the way in which caries experience accumulates as chronological age increases. The regression coefficient was found to equal 0.6 for the permanent teeth and 2.0 for the permanent tooth surfaces. Expressed in other terms, this analysis indicates that on the average each unit increase of 1 year on the

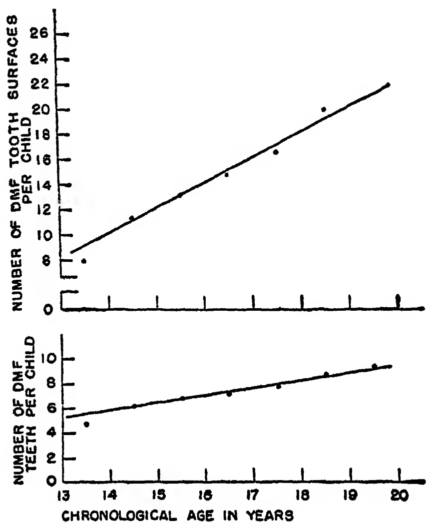

FIGURE 1.—Regression lines showing the relationship between chronological age and the number of decayed, missing, and filled permanent teeth, and tooth surfaces, per high school child.

chronological age scale between ages 13 and 19 is accompanied in the high school children studied by an increment or incidence of 0.6 carious permanent teeth and 2.0 carious permanent tooth surfaces.[7]

The prevalence and incidence of dental care in the form of fillings.—The material presented in table 3 and figure 2 gives information on the prevalence of dental care in the form of fillings in the permanent teeth of the high school children. In general, the average number of filled permanent teeth per child increases with increase in chronological age. The respective slopes of the regression lines fitted to the relations of filled teeth and filled surfaces per child and chronological age were found to equal 0.4 and 0.6. From this analysis, the yearly rate of placement of fillings is estimated at approximately 0.4 perma-

[7] These findings indicate that for each permanent tooth affected by caries, approximately 3 surfaces are involved. This relatively high value for surfaces is in part the result of the fact that the proportion of the caries experience found in the form of teeth completely destroyed by caries (extracted or only with remaining roots) is counted so that each tooth destroyed is considered equal to five surfaces with caries experience.

nent teeth and 0.6 permanent tooth surfaces filled per high school child per year.[8]

The prevalence and incidence of untreated need due to caries.—Untreated needs due to caries are formed in the high school children by open carious cavities, by remaining roots, and by extracted teeth. These aggregations of untreated need are encountered mainly because the incidence of caries proceeds at a rate higher than the rate at which fillings are placed.

TABLE 3.—*Number of filled permanent teeth and tooth surfaces, per child, by specified age groups—dental examination of 1,841 children attending the high schools of Hagerstown, Md., and of five nearby communities*

Item specified (permanent teeth)	Age (last birthday)							
	13	14	15	16	17	18	19	All ages
Number of filled teeth, per child	2 8	2.5	3 0	3.3	4 2	4.4	3.6	3 3
Number of filled surfaces, per child	3.9	3.5	4.1	4.6	6.1	6.4	5.3	4.7

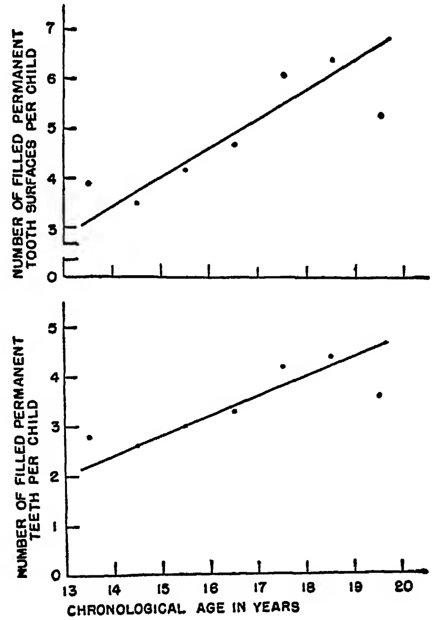

FIGURE 2.—Regression lines showing the relationship between chronological age and the number of filled permanent teeth, and tooth surfaces, per high school child.

The material shown in table 4 reveals certain of the results of the maintenance of disparities between the incidence of caries and the

[8] No account is taken in this analysis of the fact that some teeth may have been filled and then extracted before the time of the examination for the present study. In the age group covered, however, such teeth are probably relatively few in number.

incidence of dental care in the form of fillings. Before proceeding with a description of the data given in this table it is desirable to consider further the several constituents which together make up the untreated need problem in the high school children. It is clear that if carious tooth surfaces were filled as soon as they appeared in the mouth, the need for fillings, that is the number of untreated carious defects needing care, would be approximately zero. It is obvious that the nearly 3 untreated carious surfaces in 13-year-old high school children and the more than 4 carious surfaces in the 14-year-old students represent an accumulation of neglected lesions which have developed during elementary school attendance. Furthermore, the 13- and 14-year-old children entering high schools show, respectively, an average of 0.3 and 0.8 of a tooth extracted or with only remaining roots. It is reasonable to view this accumulation of surfaces needing fillings and of teeth extracted and with remaining roots as evidence of the fact that adequate dental care is not approached in the grade school children destined to attend high school.

TABLE 4.—*Number of permanent teeth and tooth surfaces with one or more untreated carious defects, number of permanent teeth extracted, number of permanent teeth with only remaining roots, and number of permanent teeth extracted and with only remaining roots (M of the DMF count), per child, by specified age groups—dental examination of 1,841 children attending the high schools of Hagerstown, Md., and of five nearby communities*

Item specified (permanent teeth)	Age (last birthday)							
	13	14	15	16	17	18	19	All ages
Number of teeth with one or more untreated carious defects, per child	1.75	2.91	2.97	3.08	2.48	2.70	3.13	2.86
Number of tooth surfaces with one or more untreated carious defects, per child	2.80	4.16	4.41	4.93	4.11	4.51	5.66	4.45
Number of teeth extracted, per child	.25	.76	.93	1.06	1.27	1.80	2.78	1.09
Number of teeth in the form of remaining roots, per child	.05	.08	.12	.15	.15	.21	.13	.13
Number of teeth extracted and in the form of remaining roots, per child	.30	.84	1.05	1.21	1.42	2.01	2.91	1.22

The number of permanent tooth surfaces with one or more carious defects requiring fillings, per child, shown in table 4, are of especial interest. Except for the low rate for the few 13-year-old children and the high rate for the 19-year-old students, the number of permanent tooth surfaces requiring treatment by fillings appears to remain relatively constant. From a study of the rates shown in the last three horizontal rows in table 4 and by reference to the filling rates shown in table 3, it may be noted that the number of tooth surfaces needing fillings tends to remain relatively constant over the high school interval because a proportion of the new need arising each year is treated by fillings, and a part of the need, some of which has been carried over from grade school years, is removed by extraction or becomes extended to form the remaining roots.

Further details of the dental status of the high school children are presented in the appendix table. From these data it may be seen that less than 4 percent of the children examined were found to be free of caries experience. Of the 1,841 children who received the examinations, 1,145, or approximately 60 percent, had one or more filled permanent teeth. It follows, therefore, that about 40 percent of the children showed no evidence of fillings in spite of the fact that less than 4 percent were free of caries experience. A total of 13,035 permanent teeth were found to be affected by caries experience, an average of more than 7 permanent teeth with evidence of caries attack per child. Of such teeth with caries experience, the children on the average had approximately 3.3 filled, 0.1 with only remaining roots, 1.0 missing (extracted), and 2.9 with one or more open cavities. Each child showed on the average more than 14 DMF permanent tooth surfaces. Of these surfaces, approximately 4.7 were filled, 0.6 were missing in the form of remaining roots, 5 were missing in the form of extracted teeth, and 4.5 surfaces showed open cavities. Expressed in other terms, it may be noted that somewhat over one-half of the high school children receive some dental care in the form of fillings in the permanent teeth, that about one-half of the teeth and approximately one-third of the surfaces affected by caries experience are treated by fillings, while close to one-half of the teeth and two-thirds of the surfaces attacked by caries show no evidence of treatment in the form of fillings. Of these latter untreated needs, approximately one-third of the teeth with unattended caries and more than one-half of the tooth surfaces with unattended caries are in a condition beyond therapeusis by fillings, that is, they are extracted or have only remaining roots.

DISCUSSION

An opinion is current in dental thought that the present problem of treating carious defects in the population is much larger than it need be considering the therapeutic potentialities of applied dentistry. The findings presented here support this view quantitatively for one segment of the population, the children attending high school. They show, in explanation of a huge reparative problem, a continued and uninterrupted maintenance of disparity between the disease and the mitigating process, that is to say, between the yearly incidence of initial carious lesions and the yearly rate at which care for those lesions is supplied. Maintaining these disparities by default allows an accumulation of untreated defects and an aggregation of those secondary extensions which develop from continued neglect.

Under present conditions, each year brings a new increment of unattended caries. This means that the average person is destined on

reaching adult age to present a problem of reparative need of an exceedingly complex character.

That the small initial lesions may be cared for by simple fillings is clear. It is also apparent that, if left untreated for some interval of time, the areas requiring filling become significantly larger, and more professional services are required to stop the process and remedy the damage already done. In the case of pulp devitalizations and tooth extractions, the need problem becomes progressively more complex and allows for differences of opinion as to what should be done. Also, as the needs become more complex, there is more chance that economic obstacles to the meeting of these needs may present themselves.

For example, when a carious tooth has progressed to the stage of devitalization, pulp-canal therapy might be recommended. If the expense of this were prohibitive, extraction might be specified. By extraction, another need is created and a removable bridge appliance might be recommended to meet it. Where economic considerations dictate a choice between services, the need for fillings in other teeth might preclude the replacement of the missing tooth. In fine, the problem of dental need obviously increases in complexity and magnitude with increase in the disparity between the incidence of carious defects and the rate of repair of the initial lesions.

In point of attainable objectives, the present treatment problem may be progressively reduced by diminishing the disparity between the incidence of service and of the disease. The basic solution, of course, lies in that at present unknown quantity, the prevention of the initiation of caries. It is generally accepted that no undisputed method is now available for preventing the initiation of carious lesions. Thus it is essential to recognize that even where provision of care equals the incidence of caries, an "irreducible" minimum[9] of carious defects may be postulated to appear each year. Since the lesions must be accepted for the time being as, in the main, unavoidable, it follows that the consideration of practical importance must be the utilization of all the potentialities of reparative dental care.

From the point of view of public health, it is desirable to emphasize that most of the deleterious effects of caries may be avoided and, therefore, the cost of their repair and treatment largely eliminated by finding and filling early carious lesions *at a rate coinciding with the rate at which the lesions appear.*

SUMMARY

Analyses of material collected from detailed dental examination of approximately 1,800 children between the ages of 13 and 19 years

[9] "Irreducible" until such time when the initiation of caries definitely may be prevented. The admittance of these perspectives in the problem would appear to indicate that the ultimate solution of the dental needs problem requires other procedures in addition to those concerned with the filling of carious defects.

Appendix Table.—*Summary of dental status, by specified age and sex groups—dental examination of 1,841 children attending the high schools of Hagerstown, Md., and of five nearby communities*

Item specified	Boys								Girls							
	Age (last birthday)															
	13	14	15	16	17	18	19	All ages	13	14	15	16	17	18	19	All ages
Number of children examined	5	142	242	193	172	74	27	855	15	189	268	252	183	74	5	986
Number of permanent teeth erupted (excluding third molars)	128	3,906	6,689	5,368	4,785	2,067	756	23,699	416	5,213	7,443	7,005	5,095	2,066	140	27,378
Number of extracted permanent teeth	3	104	212	192	238	129	86	964	2	148	260	278	212	137	3	1,040
Number of permanent teeth in the form of remaining roots	1	14	36	25	27	6	3	112	0	14	23	42	26	25	2	132
Number of extracted permanent teeth and number of permanent teeth in the form of remaining roots	4	118	248	217	265	135	89	1,076	2	162	283	320	238	162	5	1,172
Number of permanent teeth present in the mouth	125	3,802	6,477	5,176	4,547	1,938	670	22,735	414	5,065	7,183	6,727	4,883	1,929	137	26,338
Number of deciduous teeth present in the mouth	2	4	19	7	10	1	0	43	1	17	7	11	7	2	0	45
Number of permanent teeth with one or more untreated carious defects	14	431	841	653	538	211	74	2,762	21	532	672	716	344	188	26	2,49
Number of permanent tooth surfaces with one or more untreated carious defects	26	611	1,283	1,025	884	340	113	4,288	30	767	965	1,169	576	321	68	3,896
Number of filled permanent teeth	6	341	578	604	651	337	99	2,616	50	502	943	851	828	315	16	3,505
Number of filled permanent tooth surfaces	7	484	835	866	980	499	147	3,818	70	668	1,279	1,202	1,182	455	21	4,877
Number of DMF[1] permanent teeth	23	858	1,589	1,401	1,390	664	251	6,176	72	1,151	1,820	1,792	1,353	626	45	6,859
Number of DMF[1] permanent tooth surfaces	48	1,604	3,157	2,826	3,042	1,483	685	12,845	110	2,164	3,520	3,725	2,805	1,459	104	13,887
Number of children with no DMF[1] permanent teeth	0	10	14	2	2	3	0	31	0	9	11	7	3	2	0	32
Number of children with 1 or more DMF[1] permanent teeth	5	132	228	191	170	71	27	824	15	180	257	245	180	72	5	954
Number of children with 1 or more filled permanent teeth	2	77	121	109	110	51	19	489	10	112	167	160	142	51	5	656
Number of children with 1 or more untreated carious permanent teeth	4	113	193	162	135	54	25	686	7	141	182	189	105	52	2	678

[1] Decayed, missing, and filled as described in the text.

attending the high schools of six communities of Maryland indicate that:

1. The incidence of new caries is approximately 0.6 affected permanent teeth and 2.0 affected permanent tooth surfaces per high school child per year.

2. The incidence of dental care in the form of fillings is approximately 0.4 filled permanent teeth and 0.6 filled permanent tooth surfaces per high school child per year.

3. The average disparity, over the high school interval, between the rates of incidence of caries and provision of care by fillings is shown to account for an average of about one and one-third permanent teeth extracted or with remaining roots per high school child.

4. It is pointed out that the average disparity between the annual rate of development of caries and the annual rate of placement of fillings may be made to serve the function of measuring the quantitative adequacy of dental care received by population groups.

A STUDY OF THE ROLE OF VENTILATING SYSTEMS IN THE TRANSMISSION OF BACTERIA

By J. M. DallaValle, *Passed Assistant Sanitary Engineer*, and Alexander Hollaender, *Biochemist, Division of Industrial Hygiene, National Institute of Health, United States Public Health Service*

The possible spread of infection by means of ventilating systems is a problem which has received little attention. Present day air-conditioning systems often recirculate as much as 90 percent of air once cooled. Air from an infected space may thus be conveyed to a common plenum and redistributed to noninfected areas. In this manner, a ventilating system might become a factor in the spread of disease. The recent work of Wells (*1*) implies this possibility, but, so far as is known, actual quantitative tests with a ventilating system have not as yet been published. Nor can it be stated at this time how potent a force mechanical ventilation is in the spread of disease; but if we accept the important contributions of Wells and others (*1*, *2*) in the field of air bacteriology, ventilating systems must be recognized as a source of possible danger not hitherto appreciated.

In this paper tests made with two different ventilating systems are discussed. Bacteria (*B. subtilis* spores) were introduced at various points in each system.[1] Samples were taken in representative rooms with a special device described by the authors in a previous paper (*2*). The apparatus has been used successfully in a large number of tests and has been demonstrated to be a reliable instrument for sampling

[1] The organisms (*B. subtilis* spores) were introduced by means of a paint spray gun. The gun was carefully regulated to assure a constant fine spray. The organism used is not considered pathogenic and is usually present in outdoor air. Cultures of the spores were prepared in the following manner: *B. subtilis* was grown for a period of 2 weeks on beef-broth agar at 37° C. Slants were shaken with physiological salt solution and the suspension heated to 98° C. for 10 minutes to insure that all vegetating organisms were killed. The suspension was then filtered and diluted with water for use in the spray gun.

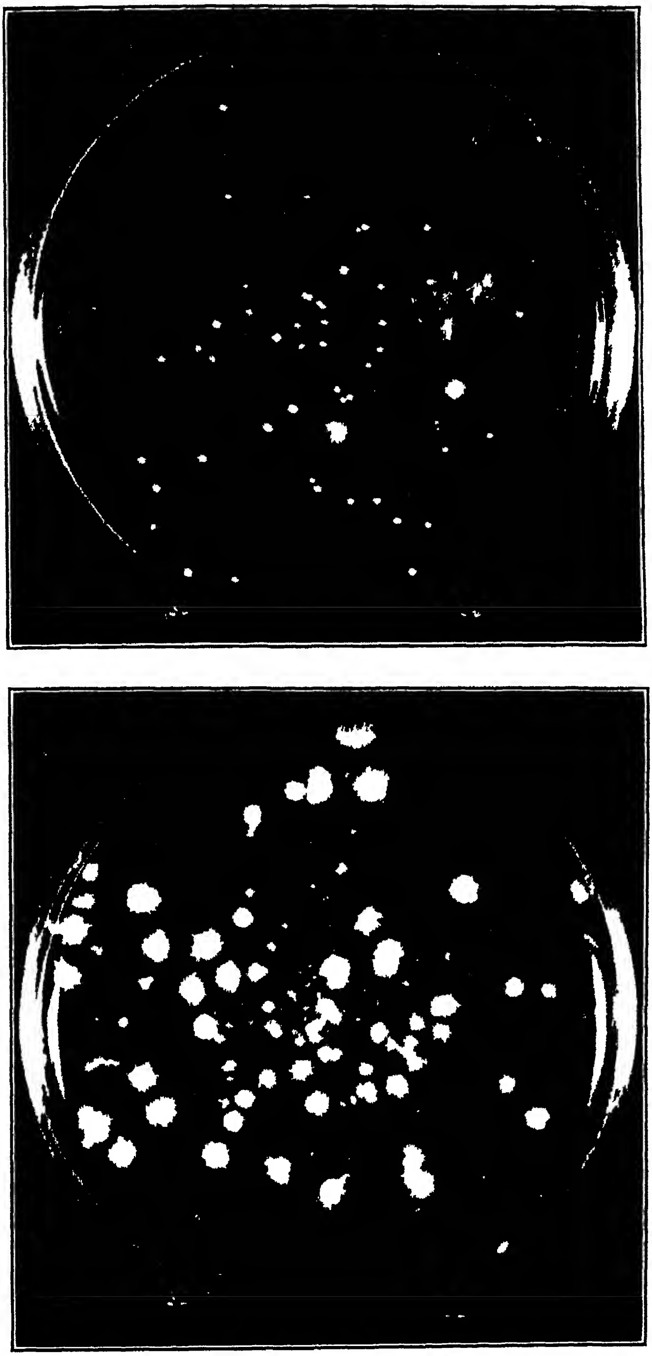

FIGURE 1.—Petri dish cultures obtained with funnel device. (Above) Sample obtained before spraying of bacteria. (Below) Sample obtained after spraying of *B. subtilis* spores (notice diffuse colonies of *B. subtilis*).

the specific organism used (3). Briefly, it consists of an inverted glass funnel fitted over a Petri dish containing nutrient agar. Air is drawn through the funnel at a rate of 1 cubic foot per minute by

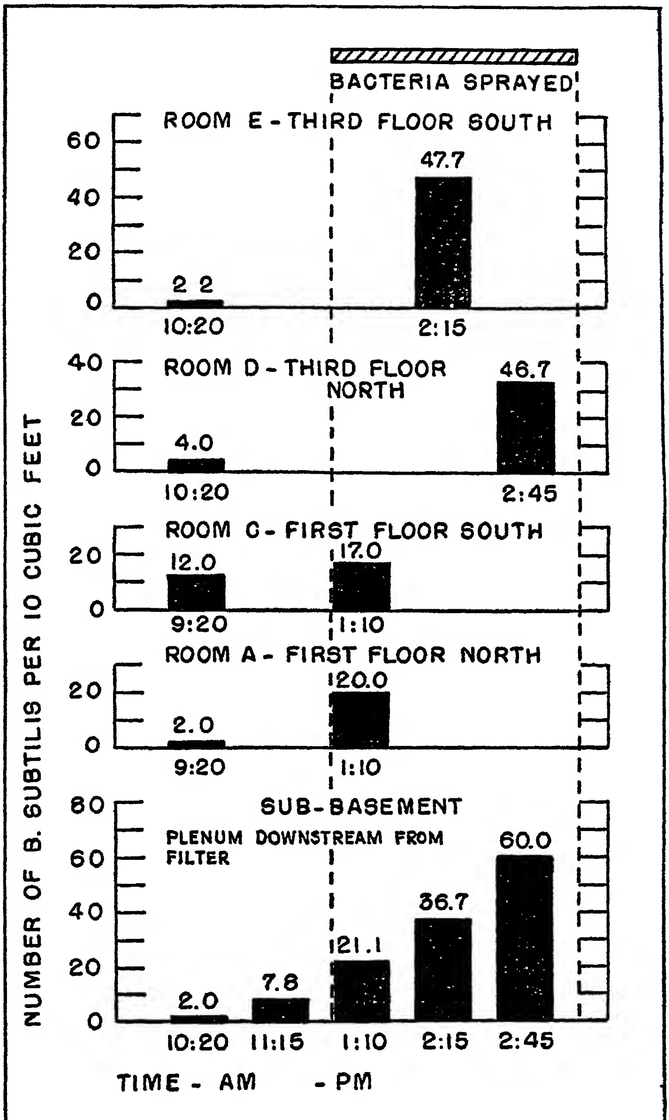

FIGURE 2.—Number of *B. subtilis* per 10 cubic feet of air before and during spraying on different floors of building. Bacteria spread into first floor air intake between 1 and 2:45 p. m.

means of an impinger motor. The air-borne bacteria are then impinged upon the agar contained in the Petri dish. *B. subtilis* can be readily distinguished from other organisms usually found in air.

The plates exposed were cultured at 37° C. for 48 hours on beef-broth agar (15 grams per liter, pH 6.2). The surface cultures obtained in this manner form large and diffuse colonies, as shown in figure 1.

In one of the ventilating systems in which tests were made, *B. subtilis* spores were first introduced beyond the filters and later some distance in front of the filters. Thus, in the first instance the bacteria proceeded through the ventilating system without being filtered, while in the second instance the reverse was true. In the second system, *B. subtilis* spores were sprayed in the return-air register located in the corridor of the first floor, and in another series of experiments spores were introduced in the mixing plenum immediately in front of the filters. Samples were taken in triplicate in parts of rooms ventilated by each system tested. Control samples were taken before and after each experiment. All samples were obtained at the breathing level.

RESULTS OF TESTS

System 1.—Auditorium, 44 by 58 by 14 feet. Ventilation system handles 8,200 cubic feet per minute (14 air changes per hour). Recirculation estimated at 30 percent. System equipped with paper-tissue filter. Air temperature during tests 70° F.

Test 1 [2]

(a) Number of *B. subtilis* per 10 cubic feet before introducing spores	None
(b) Number of *B. subtilis* per 10 cubic feet during and 15 minutes following the introduction of spores downstream of filter	21.9
(c) Number of *B. subtilis* per 10 cubic feet 1 hour after introducing spores	None

Test 2 [2]

(a) Number of *B. subtilis* per 10 cubic feet before introducing spores	None
(b) Number of *B. subtilis* per 10 cubic feet during and 15 minutes following the introduction of spores upstream of filter	3.7
(c) Number of *B. subtilis* per 10 cubic feet 1 hour after introducing spores	None

System 2.—Large building equipped with ventilating system having a four-way split. System handled 29,680 cubic feet per minute. Recirculation estimated at 25 percent.

In the first series of tests with this system the spray gun was set near the return-air register on the first-floor corridor.

Samples were taken in the following rooms:

Room	*Floor*	*Volume (feet)*	*Cubic feet of air supplied per minute*
A	1 north	20 x 20 x 10	680
C	1 south	12 x 20 x 10	600
D	3 south	12 x 20 x 10	550
E	3 north	20 x 20 x 10	680

Results of these tests are shown in figure 2.

[2] Average of several samples made at two points in auditorium.

In another group of experiments the spray gun was placed upstream of rotating oil filter in return air-mixing plenum. The fan is located at a level slightly below subbasement floor. Samples were taken in two rooms. Room A, first floor, north, 20 by 20 by 10 feet, with air supply of 680 cubic feet per minute, and room B, second floor, south, 20 by 20 by 10 feet with air supply of 600 cubic feet per minute.

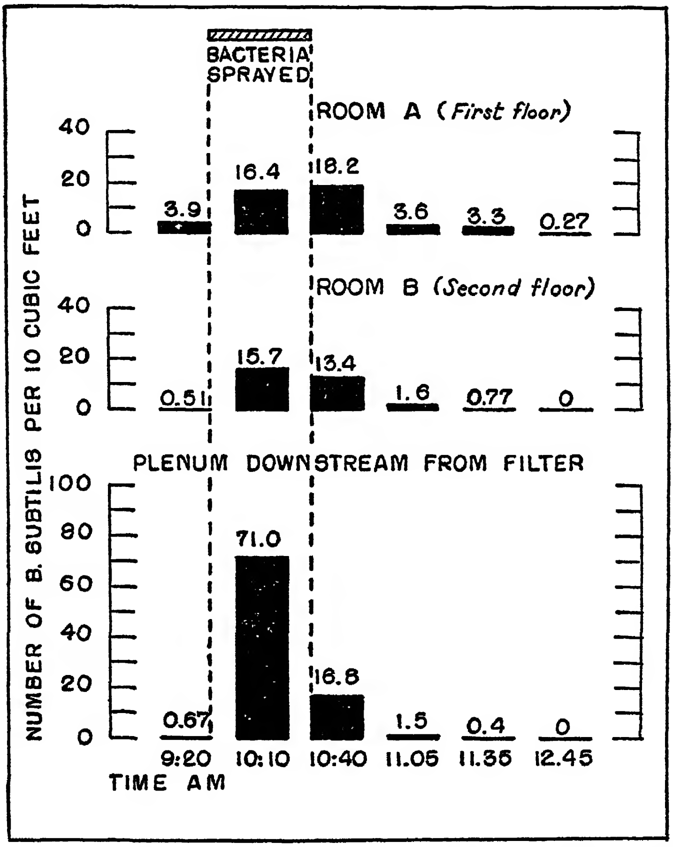

FIGURE 3.—Number of *B. subtilis* colonies per 10 cubic feet of air from samples taken simultaneously on three different floors. Bacteria spread into outside air intake between 9:30 and 10:40 a. m.

Samples in both rooms and in plenum downstream of filter taken simultaneously. Air temperature in rooms 72° F. and in downstream plenum 60° F. Results of tests are shown in figure 3.

DISCUSSION OF RESULTS

It is worth noting that the concentration of spores drops rapidly after spraying has ceased, so that in a relatively short time the bacterial population returns to its normal level. The decrease may be

attributed to the dilution factor, the action of the filter, and loss to surfaces, such as walls, floors, and the like. This loss, however, cannot be regarded as constant since undoubtedly it must vary with humidity and temperature.

It may be mentioned that the technique used has an application in the testing of ventilating systems to ascertain the effectiveness of air distribution in ventilated rooms. Thus, samples may be taken at various points following the introduction of *B. subtilis* spores and their concentration used as an index of air circulation. In making such tests it is important that the spores be prepared by a competent bacteriologist since it is possible that serious consequences may result to persons exposed to heavy concentrations of bacteria of unknown character.

The results given here were obtained under the most favorable conditions for the transmission of bacteria in ventilating systems. Not only were heavy concentrations of *B. subtilis* spores introduced, far in excess of those which would be possible under usual conditions, but also they were sprayed at advantageous points. Nevertheless, the data indicate that bacteria may be spread by a ventilating system, and lead to the conclusion that, especially in crowded spaces with a high degree of air recirculation, the potentiality is such as to merit further study from the public health standpoint.

ACKNOWLEDGMENT

Acknowledgment is given to Assistant Chemist Warren H. Reinhart and to Minor Laboratory Helper Jesse R. Dom, who assisted in the conduct of these tests.

REFERENCES

(1) Wells, W. F., and Wells, M. W.: Air-borne infection. J. Am. Med. Assoc., **107**: 1698–1703 and 1805–1809 (1936).
(2) Hollaender, Alexander, and DallaValle, J. M.: A simple device for sampling air-borne bacteria. Pub. Health Rep., **54**: 574–577 (1939)
(3) DallaValle, J. M., and Hollaender, Alexander: The effectiveness of certain types of commercial air filters against bacteria (*B. subtilis*). Pub. Health Rep., **54**: 695–699 (1939).

AMERICAN AZURES IN THE PREPARATION OF SATISFACTORY GIEMSA STAINS FOR MALARIA PARASITES [1]

By M. A. Roe, *Surgeon*, R. D. Lillie, *Surgeon*, and A. Wilcox, *Assistant Technologist, United States Public Health Service*

Hitherto, the most uniformly satisfactory stain for malaria parasites in the thick film technique has been the Giemsa stain furnished by Grübler, compounded from azure I, methylene blue, and eosin (w. g.) of German manufacture. With the interruption of the foreign supply of Giemsa stain, the problem of finding a satisfactory American

[1] From the Divisions of Infectious Diseases and of Pathology, National Institute of Health.

product has become acute, since the substitution of azure I or azure A (which have been considered synonymous terms) of American manufacture has not yielded good results.

It was felt that the problem could be attacked best by examining successively the staining action on malaria parasites of the possible chemical constituents of Grübler's azure I made up in simple combinations with eosin. The constituents in question belong to the group of thiazin dyes, namely, methylene blue, azure B, azure A, azure C, and thionin. Toluidin blue, azure IV (symmetrical dimethyl thionin), and methylene green, also belonging to the series, were examined briefly. Bernthsen's methylene violet was omitted on account of its stated insolubility in the absence of other thiazin dyes.

Spectrophotometric examinations of each dye sample used were made as a further control with the recording spectrophotometrograph of the Washington Biophysical Institute. The absorption spectra were compared with the known data of each dye for identity (*2*, *3*).

Where possible, several different samples of each dye were used. These dyes are tabulated in table 1.

TABLE 1

General description of dye			Spectrophotometric data						
Name of dye	Manufacturer or source	Lot number	Given dye content	Log 1/T at maximum at 5γ per cc.	Estimated dye content (percent)	Maximum absorption λ in mμ	90 percent maximum log 1/T: Range mμ	Width mμ	Median mμ
Methylene blue	Eimer & Amend	2	----	----	----	----	----	----	----
Do	do	3	----	1.08	88	659.2	655 3–670.9	15.7	663.1
Do	Bausch & Lomb Optical Co.	----	----	.889	85	662.6	653.9–673.1	19.3	663.5
Do	Dr. G. Grübler & Co	12 13	----	----	----	----	----	----	----
Do	National Aniline Chemical Co.	NA–6	82	.742	----	657.5	653.8–661.3	7.6	657.5
Do	Hartman-Leddon Co.	LA–7	87	1.008	----	660.9	652.1–666 7	14.7	659.4
Azure I	Dr. G. Grubler & Co	9 24	----	.588	65	653.0	634 –666	33	649.5
Azure B	Army Medical Museum	2	----	.533	60	664.0	647 –661	25	659
Do	do	12.13–24	----	.018	2?	660.0	625 –673	49	649
Do	W. C. Holmes	1926	----	.754	82	6[illegible]4.0	633 –666	34	649.5
Azure B $ZnCl_2$	National Aniline Chemical Co.	3769	----	.598	66	658.0	648 –670	23	659
Azure B Br	do	7724	----	.705	79	660.0	642 –670	29	656
Azure A	do	3513	----	.449	45	634–642	612 –653	42	632.5
Azure A or I	do	NAz–5	90	.900	----	624	606 –640	35	622.5
Azure A or I	do	NAz–6	90	.844	----	624	607 –638	32	622.5
Azure A French	do	8847	----	.680	70	618–624	606 –641	36	623.5
Azure C [1]	Army Medical Museum	11–2–25	----	.490	55	626–628	609 –643	35	626
Do [1]	do	8–1925	----	.493	55	626–632	612 –647	36	629.5
Azure C	do	2–1925	----	.180	20	616–620	606 –631	26	618 5
Do	do	22–9–25	----	.378	40	616–620	605 –633	29	619
Azure I	Harmer Laboratory	----	----	.306	32	614	559 –630	32	614.5
Azure C	National Aniline Chemical Co.	NAc–2	----	.402	45	618	601 –635	35	618
Thionin	Harleco (Ehrlich-Hoyer)	NT–1	----	.473	50?	602–608	595 –612	18	603 5
"Azure II"	Army Medical Museum	151	----	.061	7?	602	592 –614	23	603
Toluidin blue	Providence Chemical Co.	Before 1926	----	----	----	----	----	----	----
Do	Coleman & Bell	CU–1	48	----	----	----	----	----	----
Do	Biosol	162	----	----	----	----	----	----	----
Methylene green.	Farbwerke-Hoechst Co.	----	----	----	----	----	----	----	----
Azure IV	Army Medical Museum	1925	----	.482	50	636	616 –650	35	633

[1] Spectrophotometric data indicate a considerable amount of azure A.

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The staining characteristics were determined by mixing simple 1:1,000 aqueous solutions, following the old Nocht method for staining malaria parasites. The proportion of 2 moles of the thiazin to 1 of eosin was employed as a starting point. This gives 5 cc. eosin to 4.6 cc. methylene blue, 4.4 cc. azure B or toluidin blue, 4.2 cc. azure A or azure IV, 4.0 cc. azure C, and 3.8 cc. thionin. In addition 5 and 6 cc. quantities of the thiazins were used. The usual dilution called for a total volume of 50 cc. and the pH level was buffered to 7.0 and 7.4. The 1:1,000 solutions were made up on the basis of actual dye content when known; otherwise a dye content was assumed similar to that of known samples of like dating and source.

Characteristic staining effects of thiazin-eosin mixtures on thin film blood preparations for quartan and tertian malaria were found to be as follows: With methylene blue the red cell background is pink to dull pink, parasite nuclei are not stained, and cytoplasm is a medium to a light gray blue with fairly good definition. With Grübler's lot 12.13 and with the Bausch & Lomb sample cytoplasm shows a slightly greenish tinge.

One sample of methylene blue (NA–6) gave a dull purple [2] chromatin stain of fair quality, but it was shown by chloroform extraction and re-solution of the extract that a small quantity of a blue dye giving an absorption maximum of 654 mμ was present, probably azure B (λ=653 mμ).

Azure B with eosin gives quite a complete stain. Red corpuscles are pink to orange. Parasite nuclei are bluish purple, sharply outlined, and show individual chromatin granules in old trophozoites. Cytoplasm is clear gray blue and well defined. Schüffner's dots are reddish pink. Grübler's azure I, lot 9.24, is a typical example of this group. The zinc double salt (NAC No. 3769) is somewhat inferior, and one experimental lot (AMM No. 12–13–24) stained very feebly, consistently with its apparently low-dye content and wide absorption band.

Azure A gives a quite complete stain which is definitely inferior in color and detail to azure B. Red corpuscles are greenish to orange gray. Parasite nuclei are a denser and duller purple and less sharply outlined, and chromatin granules are less well shown than with azure B. Parasite cytoplasm is a dull lavender color and generally contrasts rather poorly with red cells. Two samples labeled azure C were indistinguishable from azure A in their staining, and their absorption maxima of about 628 mμ indicate that they probably are actually azure A.

Azure C gives a stain similar to azure A, but of inferior quality. Red cells are dull orange to greenish gray. Parasite nuclei are a vague purple, and contours of chromatin mass are indefinite.

[2] Purple is here defined as a distinctly bluish-red color similar to ecclesiastical or Tyrian purple.

Cytoplasm is a rather pale, dull grayish lavender. Schüffner's dots are stained very faintly.

Azure IV gave a picture intermediate between those of azure B and azure A. Methylene green gave no indication of value as a parasite stain. Thionin failed to stain malaria parasites. Toluidin blue stained red cells dull pink to lavender. Parasite nuclei were stained a faint purple with higher proportions of the thiazin and had no definition. Cytoplasm was dull slaty lavender with fair definition but poor contrast.

Summing up thus far it appears that methylene blue fails to stain parasite chromatin but is a good cytoplasmic stain. Azure A gives a fairly dense but rather vague chromatin stain and an inferior grayish lavender cytoplasm, and azure B gives excellent chromatin and cytoplasmic staining, both in color contrast and detail.

As these findings disagree sharply with the opinion hinted at by MacNeal (*1*) and definitely stated by Holmes and French (*2*), it seemed desirable to check the effects of mixtures of methylene blue with the various azures, especially as it has been suggested that whatever value azure B might have could be duplicated by mixtures of azure A and methylene blue.

Hence, mixtures were made of 5 cc. eosin, 40 cc. buffered water, and 5 cc. of a combination of methylene blue with each of the azures, varying by 0.5 cc. steps from all methylene blue to all azure.

The range of optimum staining fell between 1.5 cc. and 2.5 cc. of the azure to 3.5 cc. and 2.5 cc. of methylene blue. With the best proportions the following stains were obtained with thick films:

Azure A stained the background translucent pink and the nuclei of white cells purple. Parasite nuclei were a rather diffuse light purple, cytoplasm a pale grayish lavender and the outline of parasites vague or fuzzy. With azure B the background was clearer than the above with pinkish tinge, nuclei of white cells were deep bluish purple, parasite nuclei fairly deep red with compact chromatin mass, cytoplasm medium bluish gray, and the outline of parasites fairly sharp.

As was expected from previous work done with the azures on thin films, the staining effect of azure B was better than that of azure A. Although the azure B in itself was a fairly complete stain, the degree of density of cytoplasmic stain and of sharpness of outline was not all that could be desired.

To improve sharpness and density of the parasite stain, simple mixtures of azure B combined with azure A, methylene blue, and eosin were tested in quantities of azure B and azure A 2.5 cc., methylene blue 2.5 cc., and eosin 5.0 cc. The proportions of the azures varied by 0.5 cc. steps from all azure B to all azure A. The combination giving optimum staining effect was azure B 2.0 cc., azure A 0.5 cc., which appeared slightly better than when using azure B alone with

methylene blue. Increasing the amount of methylene blue from 2.5 cc. to 2.7 cc. definitely improved parasite density and sharpness of outline, while further increasing the amount of methylene blue to more than 2.7 cc. overstained the background. (See stain A, table 2.)

In view of the fact that azure B 2.5 cc. and methylene blue 2.5 cc. (without azure A) had previously given quite satisfactory results, the effect of increasing methylene blue to 2.7 cc. with azure B was tested. This mixture gave better results than the previous formula owing to the increased methylene blue, in much the same manner as with stain A (azure A and B mixture). (See stain B, table 2.)

Good results could also be obtained with decreased amounts of azure B to as low as 1.0 cc. if the methylene blue were at the same time increased by the same amount. The amount of eosin may also be lowered to as low as 2.0 cc. or 3.0 cc. with good staining results with thin films, although lower amounts of eosin gave too densely stained a background in the case of thick films. But a slight reduction in the amount of eosin from 5.0 cc. seemed to improve the character of the thick film background, removing some of the excess pink. (See stain C, table 2.)

TABLE 2.—*Formulae of satisfactory synthetic Giemsa solutions*

Name of dye	Stain A			Stain B			Stain C		
	Nocht formula (cc.)	Pure dye weight	Total dye weight	Nocht formula (cc.)	Pure dye weight	Total dye weight	Nocht formula (cc.)	Pure dye weight	Total dye weight
	1:1000 solution	*mg.*	*mg.*	*1:1000 solution*	*mg.*	*mg.*	*1:1000 solution*	*mg.*	*mg.*
Azure B [1] (estimated) 80 percent	2 0	200	250	2.5	250	312	1.7	170	212
Azure A [2] 90 percent	0.5	500	55	0	0	0	0	0	0
Methylene blue [3] 87 percent	2.7	270	810	2.7	270	310	3.4	340	388
Eosin Y [4] 93 percent	5.0	500	537	5.0	500	537	4.9	490	526
Glycerine	--------	50 cc.		--------	50 cc.		--------	50 cc.	
Methyl alcohol	--------	50 cc.		--------	50 cc.		--------	50 cc.	
Total	100 cc. of stain			100 cc. of stain			100 cc. of stain		

[1] NAC No. 7724. [2] NA-6. [3] LA-7. [4] LE-11.

One cubic centimeter of any one of the above stains is diluted to 50 cc. with distilled water buffered to pH 7.0. Stain 45 minutes, rinse 2-5 minutes with water of the same pH, dry and examine.

Reference has already been made to staining mixture formulas in table 2. This table illustrates the method of converting the formulas for aqueous solution mixtures into glycerol-alcoholic solutions. In a 1:1,000 aqueous stock solution, each cubic centimeter contains 1 mg. of dye. If 100 mg. of dye are dissolved in 100 cc. of glycerol-alcohol solution, each cubic centimeter will likewise contain 1 mg. of dye. In this way the formulas for aqueous stock solutions can be directly converted into glycerol-alcohol solutions, correction being made in the amount of dye weighed for actual dye content. Stain mixtures A, B,

and C of table 2 were made up in glycerol-alcohol solutions. Slides were stained in solutions made up of 1 cc. of stain in 50 cc. of buffered water pH 7.0. Results were identical for all practical purposes to those obtained from the corresponding mixtures of aqueous stock solutions.

All three of these solutions are quite satisfactory. Solution A gives a slightly greater chromatin density; C perhaps a deeper cytoplasmic stain; B is intermediate and perhaps a little less satisfactory than either of the others. The lower cost of ingredients, of course, favors formula C. The general effect varies slightly from that of the imported German Giemsa solution but appears to be at least equally good for diagnostic purposes and somewhat better for detailed cytology of the parasite.

SUMMARY

A survey has been made of the various thiazin dyes in regard to their value in staining malaria parasites when used in simple combinations with eosin. It was found that methylene blue stains parasite cytoplasm a desirable blue shade but fails to stain parasite chromatin. Azure B gives an excellent bluish purple chromatin stain with sharp definition of particles and a good, clear blue cytoplasmic stain. Azure A gives a deeper purple chromatin stain with poor definition of particles and a grayish lavender cytoplasm which contrasts poorly with red corpuscles. The other dyes are inferior.

Combinations of azure B and methylene blue varying from 1:1 to 1:4 with appropriate amounts of eosin, and with or without a small quantity of azure A, give very satisfactory parasite staining. Larger amounts of azure A are deleterious.

The Nocht method of using simple aqueous solutions is excellent for studies of Romanowsky staining, affording great facility in variation of composition and giving results directly transferable to glycerine methyl alcohol solutions.

The proper synonym for German azure I is azure B and not azure A, as has been supposed. This erroneous synonymy probably accounts for the poor results hitherto attained with American Giemsa solutions in staining malaria parasites.

Acknowledgments are made to the staff of St. Elizabeths Hospital for quartan malaria material; to the Washington Biophysical Institute for the use of their recording spectrophotometrograph; to B. Caminita, T. W. Allen, and C. C. Jones for technical assistance in the preparation and mensuration of spectrophotometrograms; to the Curator of the Army Medical Museum, Lt. Col. J. Ash, and to Dr. H. J. Conn of the Biological Stain Commission for samples of azures synthesized in the studies of Holmes and French.

REFERENCES

(1) MacNeal, W. J.: Methylene violet and methylene azure A and B. J. Infect. Dis., 36: 538–546 (1925).
(2) Holmes, W. C., and French, R. W.: The oxidation products of methylene blue. Stain Technol., 1: 17–26 (1926).
(3) Conn, H. J.: Biological Stains. Geneva, N. Y., 1936.

BURNING OLD STORAGE BATTERY BOXES STILL A SOURCE OF LEAD POISONING IN INFANTS AND CHILDREN

Cases of lead poisoning in infants and children caused by the inhalation of lead fumes from burning wooden storage battery cases have been reported in the literature from time to time. A classical description of an epidemic traced to this source was described in the Journal of the American Medical Association in 1933.[1]

Recently, Dr. E. T. Olsen, Medical Director and Assistant Superintendent of the State University and Crippled Children's Hospital of Oklahoma City, Okla., reported to the Surgeon General of the Public Health Service a similar outbreak in Oklahoma City. Four cases were reported, which recovered, and a fifth, a colored child 8 years of age, died of the intoxication. All of these cases were traced to the use of old automobile battery boxes as fuel in wood-burning stoves. The intoxication was manifested by symptoms of gastrointestinal irritation, by anemia, and encephalopathic symptoms. Lead lines were observed at the epiphyses of the long bones by roentgenographic examination and varying degrees of stippling of the red blood cells were noted.

Except for one fatal case not observed by Olsen, it would appear that the most severely affected patients were colored female children 15 and 16 months of age. There was good response to hospital management. "The medication consisted of vitamins, sedatives, iron, high calcium diet, and calcium gluconate grains 7½ three times day."

Although it would seem that the hazard is disappearing because battery boxes are now rarely made of wood, attention is called to the hazard because of its public health implications.

FUNCTIONS BROUGHT TO FEDERAL SECURITY AGENCY BY REORGANIZATION PLAN IV

FREEDMEN'S AND ST. ELIZABETHS HOSPITALS UNDER THE PUBLIC HEALTH SERVICE

Under the authority of the act (Public, No. 19, 76th Cong., 1st sess.) cited as the "Reorganization Act of 1939," approved April 3,

[1] Williams, H., Schulze, W. H., Rothschild, H. B., Brown, A. S., and Smith, F. R., Jr.: Lead poisoning. J. Am. Med. Assoc., 100: 1485–1489 (May 13, 1933).

1939, and in accordance with sections 11 and 12 of Reorganization Plan No. IV, transmitted by the President to Congress on April 11, 1940, the following transfers of institutions and functions were made to the Federal Security Agency:

SEC. 11. *Transfer of certain Interior Department Institutions.*—(a) *Saint Elizabeths Hospital.*—Saint Elizabeths Hospital in the Department of the Interior and its functions are transferred to the Federal Security Agency and shall be administered under the direction and supervision of the Federal Security Administrator. The annual report required to be submitted to the Congress by the Superintendent of the Hospital shall be submitted through the Federal Security Administrator. The annual report required to be furnished to the Secretary of the Interior by the Board of Visitors shall be furnished to the Federal Security Administrator.

(b) *Freedmen's Hospital.*—Freedmen's Hospital in the Department of the Interior and its functions are transferred to the Federal Security Agency and shall be administered under the direction and supervision of the Federal Security Administrator.

(c) *Howard University.*—The functions of the Department of the Interior relating to the administration of Howard University are transferred to the Federal Security Agency and shall be administered under the direction and supervision of the Federal Security Administrator. The annual report required to be furnished to the Secretary of the Interior by the president and directors of the University shall be furnished to the Federal Security Administrator. The Office of Education shall continue to make its inspections of and reports on the affairs of Howard University in accordance with the provisions of existing law.

(d) *Columbia Institution for the Deaf.*—The functions of the Department of the Interior relating to the administration of the Columbia Institution for the Deaf are transferred to the Federal Security Agency and shall be administered under the direction and supervision of the Federal Security Administrator. The annual report required to be furnished to the Secretary of the Interior by the president and directors of the institution shall be furnished to the Federal Security Administrator, and the annual report of the superintendent of the institution to the Congress shall be submitted through the Federal Security Administrator.

(e) *Federal Security Administrator.*—The functions transferred by this section shall be administered under the direction and supervision of the Federal Security Administrator through such officers or subdivisions of the Federal Security Agency as the Administrator shall designate.

SEC. 12. *Transfer of Food and Drug Administration.*—The Food and Drug Administration in the Department of Agriculture and its functions, except those functions relating to the administration of the Insecticide Act of 1910 and the Naval Stores Act, are transferred to the Federal Security Agency and shall be administered under the direction and supervision of the Federal Security Administrator. The Chief of the Food and Drug Administration shall hereafter be known as the Commissioner of Food and Drugs.

Transfer was made effective on June 30, 1940, in accordance with Public Resolution No. 75, Seventy-sixth Congress, third session, notwithstanding the provisions of the Reorganization Act of 1939.

On July 1, 1940, the United States Public Health Service was charged with the administration of Freedmen's Hospital and St.

Elizabeths Hospital by the following order promulgated by the Administrator of the Federal Security Agency:

By virtue of the authority contained in section 11 (e) of Reorganization Plan IV made effective June 30, 1940, by Public Resolution No. 75, Seventy-sixth Congress, approved June 4, 1940, the following order is promulgated for the guidance of all concerned:

1. Freedmen's Hospital and its functions shall be administered under the direction and supervision of the Federal Security Administrator through the Surgeon General of the Public Health Service. Subject to the provisions of Agency Orders No. 5 and No. 6, the service facilities of the Public Health Service shall be made available to and utilized by Freedmen's Hospital. The Cooperative Agreement for the Management and Operation of Freedmen's Hospital, executed October 27, 1939, by the Secretary of the Interior, the President, and the Acting Secretary of the Howard University, shall remain in full force and effect.

2. Saint Elizabeths Hospital and its functions shall be administered under the direction and supervision of the Federal Security Administrator through the Office of the Surgeon General of the Public Health Service in accordance with the following conditions:

(a) That Saint Elizabeths Hospital be maintained as a separate unit under the immediate supervision of the Surgeon General of the Public Health Service.

(b) That the rank and the relationship of the Superintendent of Saint Elizabeths Hospital to the Surgeon General and to the administrative divisions of the Public Health Service shall be like that of the Director of the National Institute of Health, except that the Division of Personnel and Accounts of the Public Health Service shall exercise no control over the personnel and fiscal matters of the institution.

(c) Saint Elizabeths Hospital shall be subject to the provisions of all Agency Orders, including Agency Orders No. 5 and No. 6.

FREEDMEN'S HOSPITAL

Freedmen's Hospital, an outgrowth of the Civil War, had its inception in the Freedmen's Bureau, the purpose of which was the care of refugees who came to Washington, D. C., in large numbers during and following the war. The hospital actually dates back to March 3, 1865, when Congress passed "An Act to Establish a Bureau for the Relief of Freedmen and Refugees." Section 2 of that act provided:

That the Secretary of War may direct such issue of provisions, clothing, and fuel as he may deem needful for the immediate and temporary shelter and supply of destitute and suffering refugees and freedmen and their wives and children, under such rules and regulations as he may direct.

In 1865 the hospital facilities were transferred to Campbell Heights, a section now known as Le Droit Park, and in 1908 the hospital was moved to its present location at Sixth and Bryant Streets NW., Washington, D. C. It was not until 1894 that Freedmen's Hospital began to emerge from its poorhouse features and to develop along educational lines.

The hospital buildings and grounds cover an area of four city blocks. Provision is made for both indigent and pay patients. The

hospital has an administrative staff of 7, house staff of 29, and an attending staff of 115. It affords interneships and provides clinical material for the medical students of Howard University. It has a school of nursing.

Freedmen's is a class A institution of 322 beds, 54 bassinets, maintains an out-patient department, and has an emergency and ambulance service and a social service. There is now under construction a tuberculosis annex which will accommodate 150 patients and is expected to be ready for occupancy about January 1, 1941.

The hospital was administered by the War Department until June 30, 1874, when it was transferred to the Interior Department, where it remained until June 30, 1940.

ST. ELIZABETHS HOSPITAL

St. Elizabeths Hospital is a Federal institution, established by an act of Congress of March 3, 1855, for the treatment and cure of persons who may develop any mental or nervous disability while in the service of the Army, Navy, Marine Corps, or Coast Guard, of civilians who are residents of the District of Columbia, and of certain other classes of patients as provided by law. An act of 1852 appropriated $100,000 for the purchase of a site for a Government Hospital for the Insane, and such a hospital was opened for the reception of patients on January 15, 1855.

St. Elizabeths Hospital is recognized by the medical profession as one of the most modern institutions of its kind in the United States. The total number of patients admitted from all sources during the first year of operation was 63. At the present time it has more than 6,200 patients and about 1,850 employees. The total number of patients under treatment during the fiscal year 1939 was more than 7,000.

The hospital facilities are situated on an elevated site of 800 acres, overlooking the Potomac River, the Eastern Branch, and the city of Washington, and comprise 168 buildings. The name of the hospital was taken from the name of the tract of land upon which the hospital is located, known from early history as the "St. Elizabeths Tract."

In addition to psychiatric wards, St. Elizabeths has special medical and surgical departments with modern equipment; X-ray department; ear, eye, nose, and throat clinic; dental clinic; and other clinics that are found in large general hospitals. It also has a modern laboratory adequately equipped to make all necessary tests for the diagnosis and treatment of any medical or surgical condition.

A social service is maintained to supplement the hospital care of patients and as few restrictions as possible are imposed. Where practicable, patients are granted reasonable ground and city parole, they

are allowed visitors, and there are no restrictions regarding mail received. Regular religious services are provided for all faiths. The hospital maintains a large circulating library and reading room, and recreation and entertainment facilities are available to paroled patients. In Hitchcock Hall, a large amusement building, with a seating capacity of 1,300, an orchestra, and large well-equipped stage, moving pictures are presented, vaudeville performances, operettas, and musicals are given, and dances are held for the patients' benefit.

The modern conception of treatment of mentally ill patients at St. Elizabeths is well set forth in the following statements presented in a pamphlet concerning the institution prepared by Dr. Winfred Overholser, superintendent:

> There is no subject upon which the general public and a great majority of patients who are admitted here are more misinformed than on the subject of mental illness and so-called insanity. In order to correct any erroneous impression which a newly admitted patient may have, the following points are stressed:
>
> There is no essential difference between a mental and a physical illness. Many so-called strictly physical illnesses reveal mental symptoms, and many nervous and mental conditions are due in part or entirely to physical causes. The nervous system is the most delicate part of the body structure, and it would, therefore, be entirely unreasonable to expect it to escape an occasional break-down.
>
> There are just as many different kinds of mental diseases as physical ones. Some of them are mild while others are more serious. The symptoms and outcome of each mental illness are correspondingly different. If a mental illness is recognized early and given prompt medical attention, improvement and recovery can be expected just as frequently as in other illnesses.

St. Elizabeths Hospital remained under the administration of the Secretary of the Interior from the date of its establishment in 1855 until June 30, 1940.

Under the Federal Security Agency, recently created and dedicated to social welfare, the Public Health Service, the first Government agency to be charged by law with the hospital care and treatment of a needy group of our population (in 1798), welcomes its new responsibilities. These responsibilities are lightened by the solid development and sound administrative direction and operation of the two institutions. To continue the excellent services rendered by them in the past, and to further development in the future as may be dictated by new practices and new needs, the Public Health Service pledges its every aid.

COURT DECISION ON PUBLIC HEALTH

Action to recover damages for trichinosis.—(United States Circuit Court of Appeals, 6th Circuit; *Troietto* v. *G. H. Hammond Co. et al.*, 110 F.2d 135; decided March 13, 1940.) An action was brought to recover damages resulting from illness alleged to have been caused by the plaintiff eating pork infected with *Trichinella spiralis.* The de-

fendants, who were claimed to have negligently sold the meat in violation of the Ohio statutes, were a wholesale meat company and a firm of retail grocers. There was evidence that the plaintiff, a boarder, at the request of his landlady, purchased on her account some fresh pork and beef at the retail grocers; that this meat, which was ground and made into balls, was fried in oil for from 6 to 8 minutes and then served; that the persons, including the plaintiff, who ate the meat later became ill; and that the attending physician diagnosed the illness as trichinosis.

The statutes of Ohio penalized the sale of diseased, corrupted, adulterated, or unwholesome provisions without making the condition thereof known to the buyer and prohibited the sale of an adulterated article of food, it being stated that food was adulterated if it consisted wholly or in part of a diseased, decomposed, putrid, infected, tainted, or rotten animal.

The trial court, at the conclusion of the plaintiff's testimony, directed a verdict in favor of the defendants on the grounds that the sale of the pork under the circumstances was neither negligent nor violative of the State statutes and that the negligence that the court inferred on the part of the landlady, in failing properly to cook the meat, which directly contributed to plaintiff's injury, should be imputed to him because she was either his agent or in a joint venture with him. The court of appeals, however, reversed the judgment of the trial court, being of the opinion that the latter court erred in so directing the verdict. The appellate court said that it was of the opinion that pork that is infected with *Trichinella* is diseased within the meaning of the Ohio law, and that its sale, even when the seller has no knowledge that it is diseased or infected, violates the statute and the seller is negligent in law. "When appellant's testimony was concluded," stated the court, "there was substantial evidence from which the jury could have found that appellant's illness was caused by his eating pork that was infected with trichinella when sold by appellees; and, under Ohio law, the court should have instructed the jury that if they found these facts appellees were negligent in law. * * * If appellees were thus negligent, it appears to be well settled, under Ohio law, that their negligence was the proximate cause of appellant's injury, even though another's negligence may have contributed thereto."

Further, the appellate court said that it was of the opinion that the trial court erred in holding that the landlady's negligence—"if indeed she was negligent"—was imputable to the plaintiff. "There is no evidence," observed the court, "that she was his agent in fact or otherwise; nor do we believe they were engaged in a joint venture."

DEATHS DURING WEEK ENDED JUNE 29, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 29, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,522	7,371
Average for 3 prior years	7,493	
Total deaths, first 26 weeks of year	231,376	229,355
Deaths under 1 year of age	492	519
Average for 3 prior years	533	
Deaths under 1 year of age, first 26 weeks of year	13,232	13,572
Data from industrial insurance companies:		
Policies in force	65,146,174	67,166,768
Number of death claims	11,776	11,326
Death claims per 1,000 policies in force, annual rate	9.5	8.8
Death claims per 1,000 policies, first 26 weeks of year, annual rate	10.3	11.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 6, 1940

Summary

The incidence of the 9 communicable diseases reported weekly by State health officers remained low for the current week, all except typhoid fever being below the figures for the preceding week, and all except influenza below the 5-year (1935–39) median expectancy. The 1940 totals to date for each of these diseases, except influenza, are also below the medians of the 5-year totals for the corresponding period.

The number of cases of typhoid fever increased from 195 for the preceding week to 215 for the current week, with the largest numbers of cases reported from the South Atlantic and South Central groups of States, Texas reporting 30 as compared with 15 for the week ended June 29, and 28 for the week ended June 22.

The number of cases of poliomyelitis decreased from 79 to 70, with 14 cases reported in California as compared with 36 last week, 15 cases in the State of Washington as compared with 12 last week, and 8 cases in Oklahoma, where no cases were reported for the preceding week.

Of 13 cases of Rocky Mountain spotted fever, 9 were reported in the eastern States.

Of a total of 40 cases of endemic typhus fever, all reported in the southern States, 12 occurred in Georgia, 8 each in Alabama and Texas, and 6 in Florida.

For the current week the Bureau of the Census reports 7,116 deaths in 88 major cities, as compared with 7,522 for the preceding week and with a 3-year (1937–39) average of 7,394 for the corresponding week. The decrease of more than 400 deaths as compared with last week brings the current figure well below the 3-year average. The infant mortality in these cities for the current week is also below that of last week as well as below the 3-year average.

Telegraphic morbidity reports from State health officers for the week ended July 6, 1940, and comparison with corresponding week of 1939 and 5-year median

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 6, 1940	July 8, 1939		July 6, 1940	July 8, 1939		July 6, 1940	July 8, 1939		July 6, 1940	July 8, 1939	
NEW ENG.												
Maine	1	0	0	------	------	------	147	15	21	0	0	0
New Hampshire	0	0	0	------	------	------	0	9	9	0	0	0
Vermont	0	0	0	------	------	------	19	108	41	0	0	0
Massachusetts	0	5	5	------	------	------	824	361	232	0	2	1
Rhode Island	0	0	0	------	------	------	53	55	20	0	0	0
Connecticut	1	0	2	------	1	1	15	151	78	0	1	0
MID. ATL.												
New York	10	10	27	[1] 4	[1] 1	[1] 1	573	738	1,290	3	4	11
New Jersey	2	6	8	1	------	2	258	22	262	0	0	0
Pennsylvania	9	7	28	------	------	------	272	85	630	2	5	5
E. NO. CEN.												
Ohio	6	11	11	16	5	2	40	13	246	2	1	2
Indiana [2]	2	6	7	2	4	7	4	4	28	0	0	0
Illinois	8	21	29	5	3	4	150	21	177	1	0	3
Michigan [3]	1	1	6	------	------	------	230	94	260	0	1	1
Wisconsin	0	0	1	5	8	10	643	216	216	0	0	0
W. NO. CEN.												
Minnesota	0	2	1	2	1	------	27	31	31	0	0	0
Iowa [4]	2	4	3	1	------	------	156	101	13	0	0	0
Missouri	0	3	3	------	------	11	18	4	16	0	0	0
North Dakota	0	0	0	------	8	1	3	15	1	0	1	1
South Dakota	4	1	1	------	------	------	3	30	5	0	1	0
Nebraska	1	0	1	------	------	------	7	6	14	1	0	1
Kansas	3	0	5	2	------	------	99	12	12	0	1	0
SO. ATL.												
Delaware	0	0	0	------	------	------	1	4	4	0	0	0
Maryland [2] [3]	0	4	3	2	3	1	10	17	32	1	0	0
Dist. of Col.	1	0	8	------	------	------	2	47	34	0	0	0
Virginia [2]	2	10	6	25	19	------	56	128	89	0	2	3
West Virginia [3]	2	3	4	2	1	4	9	4	34	0	0	0
North Carolina [4]	1	3	5	2	1	------	35	37	37	0	2	2
South Carolina [4]	6	4	3	93	111	53	8	7	14	0	2	1
Georgia [4]	3	11	7	13	4	------	43	10	------	0	1	1
Florida [4]	0	0	1	------	3	------	9	13	9	0	1	1
E. SO. CEN.												
Kentucky	1	3	3	1	6	3	56	4	45	2	3	3
Tennessee [4]	3	4	5	12	7	8	27	41	41	2	0	3
Alabama [4]	1	9	9	3	4	4	133	39	25	0	0	1
Mississippi [3]	3	6	4	------	------	------	------	------	------	0	2	1
W. SO. CEN.												
Arkansas	0	3	3	4	6	6	12	10	9	0	0	0
Louisiana [4]	1	6	9	9	10	10	3	11	5	1	0	0
Oklahoma	4	1	4	10	4	12	12	8	17	3	0	1
Texas [4]	8	14	14	61	34	60	171	99	86	1	0	0
MOUNTAIN												
Montana	1	0	0	------	2	------	31	45	8	0	0	0
Idaho	0	0	0	1	------	------	4	7	3	0	0	0
Wyoming [3]	1	0	0	------	------	------	14	18	3	0	0	0
Colorado [2] [5] [6]	15	8	5	1	10	------	16	14	36	0	0	0
New Mexico	2	0	2	------	------	------	32	10	10	0	0	0
Arizona	0	2	1	18	27	11	36	2	15	0	0	0
Utah [3]	0	2	1	------	1	------	79	46	41	0	0	0
PACIFIC												
Washington	2	3	1	------	------	------	63	519	97	0	0	0
Oregon	8	2	1	------	3	4	48	34	14	0	0	0
California [4]	16	22	22	17	9	11	136	481	477	2	2	2
Total	126	197	288	312	296	296	4,587	3,746	5,642	21	32	78
27 weeks	7,898	10,424	12,479	166,984	149,771	140,369	212,527	338,261	338,261	970	1,205	3,708

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 6, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1935–39	Week ended		Median 1935–39	Week ended		Median 1935–39	Week ended		Median 1935–39
	July 6, 1940	July 8, 1939		July 6, 1940	July 8, 1939		July 6, 1940	July 8, 1939		July 6, 1940	July 8, 1939	
NEW ENG.												
Maine	0	0	1	2	4	6	0	0	0	1	3	1
New Hampshire	0	0	0	0	1	2	0	0	0	0	0	0
Vermont	0	0	0	0	1	2	0	0	0	0	1	0
Massachusetts	1	0	1	54	43	74	0	0	0	2	5	2
Rhode Island	1	0	0	4	6	6	0	0	0	0	0	0
Connecticut	0	1	0	20	12	23	0	0	0	0	0	0
MID. ATL.												
New York	0	4	4	170	108	212	0	0	0	6	4	7
New Jersey	0	1	1	65	51	43	0	0	0	2	1	3
Pennsylvania	2	0	0	100	128	131	0	0	0	13	4	12
E. NO. CEN.												
Ohio	3	0	1	105	40	98	0	13	2	8	7	10
Indiana [2]	2	0	1	7	12	27	1	16	3	1	5	7
Illinois	1	0	2	133	78	149	4	2	4	4	7	7
Michigan [3]	1	4	1	67	89	135	0	0	0	2	1	3
Wisconsin	1	0	1	50	57	83	2	1	3	1	0	2
W. NO. CEN.												
Minnesota	1	0	0	32	15	39	1	5	5	0	0	1
Iowa [2]	1	0	0	15	16	23	9	20	16	3	3	1
Missouri	0	0	1	12	8	19	0	9	6	5	4	12
North Dakota	0	0	0	4	2	5	0	0	3	1	2	0
South Dakota	0	0	0	2	6	9	4	7	6	0	0	0
Nebraska	1	0	0	8	4	9	0	0	2	0	0	0
Kansas	4	0	0	21	22	25	1	0	0	3	1	5
SO. ATL.												
Delaware	0	0	0	1	2	2	0	0	0	2	0	0
Maryland [2] [3]	0	0	0	11	5	12	0	0	0	2	0	4
Dist. of Col.	0	0	0	11	3	5	0	0	0	0	0	0
Virginia [2]	2	1	1	8	11	11	0	0	0	12	35	16
West Virginia [3]	2	0	0	10	14	14	1	1	0	5	9	8
North Carolina [4]	1	6	4	18	13	15	0	0	0	4	11	10
South Carolina [4]	0	20	0	1	0	2	0	0	0	14	35	26
Georgia [4]	0	10	3	9	4	4	0	1	0	21	25	25
Florida [4]	1	4	1	1	1	1	0	0	0	4	2	1
E. SO. CEN.												
Kentucky	2	1	1	8	7	12	0	0	1	7	23	23
Tennessee [4]	0	2	2	11	15	13	1	0	0	3	33	29
Alabama [4]	1	2	4	14	9	8	2	0	0	5	6	19
Mississippi [3]	2	1	1	2	7	5	0	0	0	8	12	13
W. SO. CEN.												
Arkansas	0	0	0	3	2	2	0	0	0	8	16	17
Louisiana [4]	0	0	0	4	4	4	0	0	0	12	23	20
Oklahoma	8	3	1	9	4	8	1	6	0	13	20	16
Texas [4]	1	4	2	20	17	17	2	0	2	30	43	43
MOUNTAIN												
Montana	1	0	0	12	6	9	0	5	18	0	3	2
Idaho	1	0	0	5	1	2	0	6	2	0	0	0
Wyoming [3]	0	1	0	5	0	5	0	0	0	0	0	0
Colorado [2] [5] [6]	0	0	0	2	8	18	1	0	2	0	2	2
New Mexico	0	0	0	1	3	7	0	0	0	3	2	7
Arizona	0	1	1	2	1	4	0	0	0	0	2	3
Utah [3]	0	0	0	6	9	10	0	0	0	0	1	1
PACIFIC												
Washington	15	0	0	19	14	14	1	2	3	4	5	1
Oregon	0	0	0	9	5	7	0	0	3	1	1	1
California [4]	14	18	8	57	53	79	0	13	4	5	4	5
Total	70	84	84	1,130	921	1,550	31	107	112	215	361	426
27 weeks	844	877	877	114,067	111,719	158,823	1,794	8,350	7,466	2,861	4,164	4,245

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 6, 1940, and comparison with corresponding work of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended July 6, 1940	Whooping cough, Week ended July 8, 1939
NEW ENG.		
Maine	22	4
New Hampshire	0	2
Vermont	14	36
Massachusetts	84	70
Rhode Island	8	13
Connecticut	26	38
MID. ATL.		
New York	215	413
New Jersey	52	222
Pennsylvania	238	462
E. NO. CEN.		
Ohio	243	103
Indiana [2]	17	86
Illinois	88	229
Michigan [3]	146	121
Wisconsin	88	256
W. NO. CEN.		
Minnesota	39	21
Iowa [2]	63	27
Missouri	36	17
North Dakota	6	15
South Dakota	4	0
Nebraska	9	20
Kansas	50	19
SO. ATL.		
Delaware	4	7
Maryland [2] [3]	128	41
Dist. of Col	3	29
Virginia [2]	69	261
West Virginia [3]	46	9
North Carolina [4]	123	112
SO. ATL.—continued		
South Carolina [4]	22	90
Georgia [4]	37	49
Florida [4]	10	6
E. SO. CEN.		
Kentucky	61	21
Tennessee [4]	62	71
Alabama [4]	16	52
Mississippi [3]	----------	----------
W. SO. CEN.		
Arkansas	37	18
Louisiana [4]	4	12
Oklahoma	17	3
Texas [4]	234	70
MOUNTAIN		
Montana	6	5
Idaho	7	12
Wyoming [2]	17	3
Colorado [2] [5] [6]	9	51
New Mexico	22	13
Arizona	3	8
Utah [3]	103	55
PACIFIC		
Washington	29	8
Oregon	16	7
California [4]	257	85
Total	2,850	3,272
27 weeks	86,536	105,049

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended July 6, 1940, 13 cases as follows: Indiana, 1; Iowa, 2; Maryland, 4; Virginia, 2; Wyoming, 3; Colorado, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 6, 1940, 40 cases as follows: North Carolina, 1; South Carolina, 1; Georgia, 12; Florida, 6; Tennessee, 1; Alabama, 8; Louisiana, 2; Texas, 8; California, 1.
[5] Colorado tick fever, week ended July 6, 1940, Colorado, 3 cases.
[6] Tick paralysis, week ended July 6, 1940, Colorado, 1 case.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 22, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Date for 90 cities:											
5-year average	119	39	17	3,106	355	1,005	12	367	43	1,209	--------
Current week [1]	56	27	9	3,189	278	759	0	324	34	1,107	--------
Maine:											
Portland	0	------	0	50	0	0	0	0	0	9	27
New Hampshire:											
Concord	0	------	0	0	2	0	0	1	0	0	10
Manchester	0	------	0	0	0	0	0	0	0	0	13
Nashua	0	------	0	0	0	0	0	0	0	0	7
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	11
Rutland	0	------	2	0	0	0	0	1	0	0	6
Massachusetts:											
Boston	1	------	0	153	10	28	0	15	0	47	216
Fall River	0	------	0	108	0	1	0	0	0	0	27
Springfield	0	------	0	5	0	4	0	1	0	5	29
Worcester	0	------	0	231	6	3	0	1	0	9	39
Rhode Island:											
Pawtucket	0	------	0	2	0	0	0	0	1	1	15
Providence	0	------	1	84	0	0	0	2	2	4	52
Connecticut:											
Bridgeport	0	------	0	4	2	1	0	1	1	0	38
Hartford	0	------	0	0	1	9	0	2	0	0	30
New Haven	0	------	0	1	0	4	0	0	0	20	18
New York:											
Buffalo	0	------	1	1	2	3	0	6	0	7	147
New York	8	7	0	516	59	179	0	66	4	130	1,373
Rochester	0	------	0	9	2	0	0	1	0	12	71
Syracuse	0	------	0	1	3	10	0	2	0	5	55
New Jersey:											
Camden	2	------	0	0	0	10	0	0	0	0	27
Newark	0	1	1	443	5	21	0	4	0	35	104
Trenton	0	------	0	0	0	1	0	0	0	1	31
Pennsylvania:											
Philadelphia	2	------	0	236	12	45	0	28	3	46	458
Pittsburgh	1	3	2	2	9	14	0	5	0	25	139
Reading	0	------	0	2	0	0	0	1	0	12	19
Scranton	0	------	------	0	------	1	0	------	0	0	------
Ohio:											
Cincinnati	1	------	0	2	5	5	0	6	1	19	131
Cleveland	1	5	1	7	3	29	0	15	1	39	181
Columbus	6	------	0	3	0	4	0	3	1	11	80
Toledo	1	------	0	3	2	17	0	4	0	16	61
Indiana:											
Anderson	0	------	0	0	0	1	0	0	0	3	9
Fort Wayne	0	------	0	5	1	0	0	0	0	4	21
Indianapolis	0	------	0	3	0	1	0	3	0	13	78
Muncie	0	------	0	0	1	0	0	0	0	3	9
South Bend	0	------	0	0	0	0	0	0	0	0	18
Terre Haute	0	------	0	0	0	0	0	0	0	1	13
Illinois:											
Alton	0	------	0	0	1	2	0	0	1	0	10
Chicago	11	------	0	151	22	215	0	26	1	46	662
Elgin	0	------	0	1	0	0	0	0	0	2	6
Moline	0	------	0	11	0	1	1	0	0	0	15
Springfield	0	------	0	0	2	2	0	0	0	5	22
Michigan:											
Detroit	2	------	0	343	9	50	0	11	0	97	235
Flint	0	------	0	1	1	3	0	0	0	5	20
Grand Rapids	0	------	0	11	0	11	0	0	0	23	36
Wisconsin:											
Kenosha	0	------	0	42	0	0	0	0	0	0	9
Madison	0	------	0	39	0	1	0	0	0	3	5
Milwaukee	0	------	0	361	5	21	0	3	0	2	103
Racine	0	------	0	9	0	3	0	1	0	0	9
Superior	0	------	0	43	0	2	0	0	0	0	7

[1] Figures for Barre estimated; report not received.

City reports for week ended June 22, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0		0	4	0	1	0	0	0	0	22
Minneapolis	0		0	1	3	8	0	1	0	7	83
St. Paul	0		0	0	1	2	0	0	0	5	48
Iowa:											
Cedar Rapids	0			0		0	0		0	0	
Davenport	0			2		2	0		0	0	
Des Moines	1		0	5	0	5	0	0	0	0	24
Sioux City	0			2		0	0		0	0	
Waterloo	1			7		0	0		0	1	
Missouri:											
Kansas City	0		0	2	5	0	0	4	0	1	90
St. Joseph	0		0	0	1	0	0	1	0	0	23
St. Louis	0		0	2	10	4	0	6	0	12	162
North Dakota:											
Fargo	0		0	0	0	1	0	0	0	0	8
Grand Forks	0			0		0	0		0	1	
Minot	0		0	0	0	0	0	0	0	3	4
South Dakota:											
Aberdeen	0			0		0	0		0	1	
Nebraska:											
Lincoln	0			0		1	0		0	0	
Omaha	0		0	9	1	2	0	0	0	2	43
Kansas:											
Lawrence	0		0	0	0	0	0	0	0	0	2
Topeka	0		0	30	0	0	0	0	0	1	11
Wichita	0		0	0	0	1	0	0	1	5	21
Delaware:											
Wilmington	0		0	0	0	2	0	0	1	1	24
Maryland:											
Baltimore	1	2	0	1	15	5	0	9	0	140	190
Cumberland	0		0	0	0	0	0	0	0	0	13
Frederick	0			0		0	0		0	0	
Dist. of Col.:											
Washington	0		0	3	7	6	0	8	1	4	158
Virginia:											
Lynchburg	0		0	0	0	0	0	1	0	0	12
Richmond	0		1	0	2	0	0	1	1	0	42
Roanoke	0		0	38	0	0	0	0	0	0	13
West Virginia:											
Charleston	0		0	1	1	0	0	0	0	1	13
Huntington	0			0		0	0		0	0	
Wheeling	0		0	1	0	3	0	0	0	0	18
North Carolina:											
Gastonia	0			0		0	0		0	1	
Raleigh	0		0	1	0	1	0	4	0	0	29
Wilmington	0		0	0	0	0	0	0	0	0	15
Winston-Salem	0		0	0	1	0	0	0	0	0	16
South Carolina:											
Charleston	0	1	0	0	2	1	0	2	0	0	14
Florence	0		0	0	1	0	0	0	0	0	13
Greenville	0		0	0	1	0	0	1	0	0	10
Georgia:											
Atlanta	0		0	6	5	2	0	8	0	2	57
Brunswick	0		0	0	1	0	0	1	0	0	3
Savannah	0		0	0	2	0	0	3	1	1	27
Florida:											
Miami	0		0	1	1	0	0	4	1	0	36
Tampa	0		0	14	1	1	0	2	0	2	26
Kentucky:											
Ashland	0		0	0	1	0	0	0	0	1	3
Covington	0		0	3	0	3	0	1	0	0	8
Lexington	0		0	53	1	0	0	1	0	11	15
Tennessee:											
Knoxville	0		0	1	0	5	0	0	0	0	17
Memphis	0		1	24	4	2	0	4	0	16	71
Nashville	0		0	2	5	0	0	2	0	6	41
Alabama:											
Birmingham	0		0	3	6	1	0	2	3	1	62
Mobile	0		0	0	2	1	0	1	1	0	24
Montgomery	0			0		0	0		0	0	
Arkansas:											
Fort Smith	0			1		0	0		1	0	
Little Rock	0		0	0	1	1	0	1	0	2	
Louisiana:											
Lake Charles	0		0	0	1	0	0	0	0	0	5
New Orleans	2	1	1	1	8	4	0	4	4	30	119
Shreveport	0		0	0	3	0	0	0	0	0	49

City reports for week ended June 22, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Oklahoma:											
Tulsa	0	------	0	0	2	1	0	1	0	17	14
Texas:											
Dallas	1	------	0	0	1	1	0	3	1	8	53
Fort Worth	0	------	0	2	1	0	0	2	0	0	38
Galveston	0	------	0	0	0	0	0	0	0	0	12
Houston	1	1	0	4	4	2	0	5	1	6	66
San Antonio	0	------	0	1	5	0	0	7	0	9	63
Montana:											
Billings	0	------	0	0	1	1	0	0	0	0	12
Great Falls	0	------	0	16	0	0	0	0	0	0	10
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	------	0	0	0	1	0	0	1	0	8
Idaho:											
Boise	0	------	0	2	0	0	0	0	0	0	9
Colorado:											
Colorado Springs	0	------	0	0	0	0	0	0	0	0	10
Denver	6	------	0	9	2	1	0	3	1	7	87
Pueblo	0	------	0	1	1	0	0	1	0	0	7
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	3	1	0	12
Utah:											
Salt Lake City	0	------	0	115	1	0	0	3	0	83	46
Washington:											
Seattle	2	------	0	46	2	3	0	3	0	23	79
Spokane	0	------	0	3	0	2	0	1	0	1	33
Tacoma	0	------	0	2	1	0	0	0	0	0	26
Oregon:											
Portland	1	------	0	16	0	1	0	2	0	15	76
Salem	0	------	--------	4	-------	0	0	-------	0	1	--------
California:											
Los Angeles	5	5	0	16	6	13	0	23	2	53	326
Sacramento	2	1	0	1	1	3	0	1	0	16	21
San Francisco	1	------	0	3	5	4	0	2	0	30	146

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
New York:			
Buffalo	1	0	0
New York	1	0	0
Pennsylvania:			
Pittsburgh	1	0	0
Indiana:			
Indianapolis	1	0	0
Illinois:			
Chicago	1	1	0
Iowa:			
Sioux City	0	0	1
Waterloo	0	0	1
Missouri:			
St. Louis	0	0	1
Nebraska:			
Omaha	0	0	1
Kansas: Wichita	0	0	1
District of Columbia:			
Washington	0	0	1
Tennessee:			
Memphis	0	1	0
Louisiana:			
Shreveport	0	1	0
Washington:			
Tacoma	0	0	5
California:			
Los Angeles	0	0	6

Encephalitis, epidemic or lethargic.—Cases: Bridgeport, 1; New York, 2; St. Louis, 1; Charleston, S. C., 2.
Pellagra.—Cases: Savannah, 1; Birmingham, 1; Los Angeles, 1.
Typhus fever.—Cases: New York, 1; Miami, 1; Mobile, 2; New Orleans, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 1, 1940.—During the week ended June 1, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1		2	3			1		7
Chickenpox		22	14	170	432	50	19	3	37	747
Diphtheria		1		21	2	2	1	4		31
Dysentery				5	3					8
Influenza		19			15				109	143
Measles	1		3	384	317	201	171	17	160	1,314
Mumps			1	27	267	7	13	1	15	331
Pneumonia		5			25	4	1		4	39
Scarlet fever		8	2	112	89	19	6	20	2	258
Trachoma									4	4
Tuberculosis	2	6	14	107	37			2		168
Typhoid and paratyphoid fever		1	4	20			1			26
Whooping cough		60	12	184	62	24	16		20	378

LATVIA

Notifiable diseases—January-March 1940.—During the months of January, February, and March 1940, cases of certain notifiable diseases were reported in Latvia as follows:

Disease	January	February	March	Disease	January	February	March
Botulism	1		1	Poliomyelitis	1	1	1
Cerebrospinal meningitis	8	2	11	Puerperal septicemia			16
Diphtheria	180	119	111	Scarlet fever	491	493	333
Erysipelas	50	55	60	Tetanus	2	1	
Influenza	127	263	258	Trachoma	55	71	58
Lead poisoning	12	11	5	Tuberculosis	162	246	220
Lethargic encephalitis	1		1	Typhoid and paratyphoid fever	47	40	58
Measles	382	477	601	Whooping cough	98	93	153
Mumps	141	201	227				

YUGOSLAVIA

Communicable diseases—4 weeks ended May 19, 1940.—During the 4 weeks ended May 19, 1940, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	16	5	Paratyphoid fever	6	
Cerebrospinal meningitis	397	105	Poliomyelitis	1	
Diphtheria and croup	336	26	Scarlet fever	173	
Dysentery	15	2	Sepsis	13	5
Erysipelas	131	3	Tetanus	56	18
Favus	5		Typhoid fever	169	10
Lethargic encephalitis	2	1	Typhus fever	55	2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of June 28, 1940, pages 1188–1191. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Shanghai.—During the week ended June 22, 1940, 1 case of cholera was reported in Shanghai, China.

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Public Health Reports

VOLUME 55 JULY 19, 1940 NUMBER 29

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE * 1798 *

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

Vol. 55 • JULY 19, 1940 • *No. 29*

THE GEOGRAPHIC DISTRIBUTION OF DISEASE

III. A DECADE OF POLIOMYELITIS IN LOUISIANA[1]

By ALBERT E. CASEY, and BRANCH J. AYMOND, *Director of Research, Louisiana State Department of Health*

The finding of a definite concentration of cases of St. Louis encephalitis in the St. Louis area in weedy places about sewage-polluted streams (*1*) prompted the study of the geographic distribution of a somewhat similar disease, poliomyelitis, in Louisiana. The files of the State Department of Health for the decade ended January 1, 1939, contain reports of 676 cases, practically all of which, it may be assumed, are actual instances of paralysis, since it is not the custom in Louisiana to report abortive cases.

Detailed maps of the 64 parishes in Louisiana were obtained from the Departments of Agriculture and Home Economics of Louisiana State University. Parish health unit directors and their staffs and other interested physicians generously took the time to secure and plot the exact home address of each patient at the time of the onset of the disease, thus circumventing the custom of rural residents of giving the nearest town as their home address. The population of all incorporated communities, wards, and parishes in Louisiana was obtained from the United States Census of 1930. The population of unincorporated communities was obtained from a commercial atlas and was corrected, whenever this was possible, by data in the possession of the State Department of Health.

Accurate data were thus obtained for 59 parishes, in which the distribution of the population and of the cases of poliomyelitis,

[1] From the Department of Pathology and Bacteriology of the School of Medicine of Louisiana State University, and the Louisiana State Department of Health.

according to incorporated and unincorporated communities of various populations, was as follows:

TABLE 1

Size of community	Number of places	Total population	Poliomyelitis cases		x^2/m (8)	Rate per 100,000 population
			Actual	Expected		
	Incorporated places					
Under 100	1	27	0	----------	----------	----------
100–499	50	17,603	12	6 0	6 00	68 2
500–999	42	30,467	23	10 3	15 65	75 5
1,000–1,499	25	29,651	21	10 0	19 60	80 9
1,500–1,999	15	25,888	24	8.7	26 90	92 7
2,000–2,999	14	27,681	21	9 4	14 31	75 9
3,000–4,999	18	68,629	29	23 2	1 45	42 2
5,000–49,999	12	117,822	36	39 9	.38	30 6
50,000–499,999	2	535,417	128	----------	----------	----------
	Unincorporated places					
Under 100 (rural)	----------	890,208	286	301.4	0.79	32 13
100–499	195	[1] 43,342	[1] 26	[1] 14.7	[1] 8.68	[1] 60 0
500–999	37	[1] 22,561	[1] 7	[1] 7.6	[1] .05	[1] 31 0
1,000–1,999	9	[1] 16,448	[1] 2	----------	----------	----------
Total	----------	1,825,374	618	618.0	93.81+	33 9

[1] Based on estimated populations and estimated community boundaries.

Statistically significant preponderances of poliomyelitis were found in both incorporated and unincorporated communities of 100–499 population. The highest preponderances were found in incorporated communities of 500–2,999 inhabitants, the maximum incidence being reached in communities of 1,500–1,999 inhabitants (table 1). The increase in incidence from rural communities to communities of 1,500–1,999 population, and the decrease from communities of this size to those of 5,000–49,999 population, were orderly and formed a unimodal curve when plotted (fig. 1).

It was of interest to find that rural areas, when interpreted as unincorporated communities of less than 100 inhabitants, and urban communities of 5,000–49,999 inhabitants had the same low incidence of poliomyelitis. The incidence in the only two large cities in Louisiana corresponded with the incidence of the disease in smaller cities, but the limited number of cities does not permit adequate analysis. Unincorporated communities of over 500 inhabitants, which for the most part are industrial in Louisiana, had an incidence of poliomyelitis similar to that of cities and rural areas and significantly lower than the incidence for incorporated communities of the same size. The possible explanations for this discrepancy will be considered later in this paper.

The age distribution of the cases of poliomyelitis in this series does not differ from the age distribution in other reports, the mode being 2 to 3 years and the mean age 7 years. Variations in age, however, do not explain the preponderance of the disease in small incorporated

communities. The average age of the patients in rural communities of less than 100 inhabitants was 6.0 years; of the patients in New Orleans, where the disease was endemic, 6.8 years; of the patients in Shreveport, where the disease was largely epidemic, 6.9 years; and of the patients in small towns of 500–2,999 inhabitants, 7.2 years. All of these age distributions had the same modal points, and the mean ages showed no statistically significant differences. Because of the lack of age variations, immunological differences probably do not account for the preponderance of poliomyelitis in small towns.

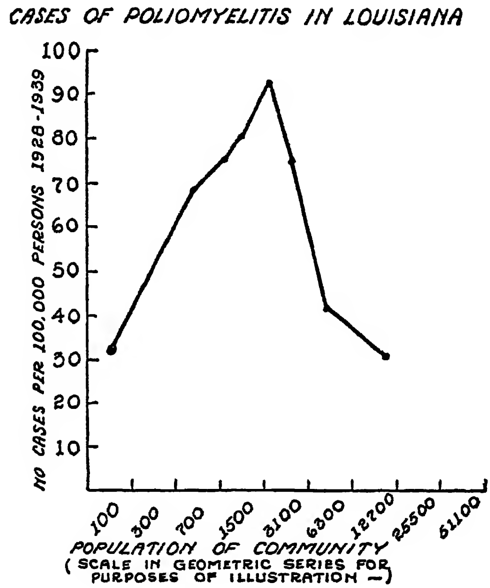

FIGURE 1.

The variations in incidence cannot be explained on the basis of either sex or race. Three hundred and sixty-four patients were male and 324 female, which is a statistically insignificant sex difference and compatible with the usual preponderance of males among children. The racial distribution in small towns is shown in the following table, there being no significant difference between the three types of communities in this regard (Chi square=3.44, n=2, P=0.21):

TABLE 2

Size of community	Actual values			Expected values			d^2/m (S)
	Colored	White	Total	Colored	White	Total	
Under 100	99	178	277	89.6	187.4	277	1.46
500–2,999	23	64	87	28.1	58.9	87	1.37
3,000–499,999	41	99	140	45.3	94.7	140	.61
Total	163	341	504	163.0	341.0	504	3.44

In summary, analysis of the incidence of poliomyelitis in Louisiana over a decade revealed the same low incidence of the disease in urban and rural (under 100 inhabitants) communities. There was, however, a significant preponderance of cases in incorporated communities of 500–2,999 inhabitants. This preponderance formed a unimodal curve with a peak at the communities of 1,500–1,999 and could not be explained on the basis of age, sex, or race.

The only characteristic in which small incorporated towns differ from rural communities and which might have a bearing on the matter seemed to be the presence of a water supply and the absence of a sewage disposal system. Unincorporated towns and rural communities dispose of human excreta by slow desiccation in the open air,

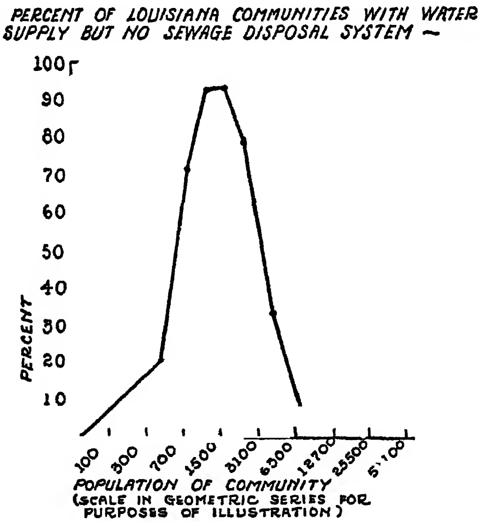

FIGURE 2.

and the first attempt in modernization is usually the construction of a water supply system which disposes of human excreta in a liquefied form and permits the emulsions to accumulate and stagnate in ditches.

A study of communities in Louisiana in regard to water supply and sewage disposal [2] was undertaken from official data obtained through the courtesy of the Bureau of Sanitary Engineering of the State Department of Health. The percentage of communities of various populations which had water supplies but no facilities for sewage disposal was plotted, and the result was a unimodal curve which had a skew in the ascending limb, a modal point, and a sharp descending limb. This curve coincided remarkably with the curve for the preponderance of poliomyelitis (fig. 2), and the correlation was significant.

[2] This study had been under way for more than a year and was in preparation for publication when the recent interesting article by Paul, Trask, and Culotta (2) appeared.

A further analysis of the data revealed that in those communities in which the daily per capita supply of water was less than 10 gallons, the rate of poliomyelitis for the decade was 32.1 cases per 100,000 inhabitants. In those communities in which the daily per capita supply was 10–49 gallons, the rate was 64.1 per 100,000 inhabitants; in communities where the daily per capita supply was 50–89 gallons, the rate was 120.0; and in communities in which the daily per capita supply was 90–500 gallons, the rate was 39.0 per 100,000 inhabitants, which is approximately the rural-urban rate. This observation, which is statistically significant, was true only of communities without sewage disposal.

The rate for poliomyelitis for the decade was over 120 per 100,000 (maximum rate, fig. 3) in 16 communities in Louisiana with more than

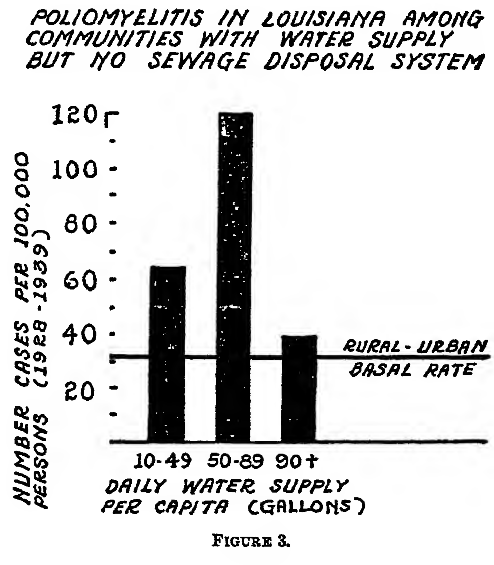

FIGURE 3.

500 inhabitants. In 8 of these communities, in which the population was 1,500–2,999, the average per capita daily water supply was 64.6 gallons. In the other 8, in which the population was 500–1,499, the average per capita daily water supply was 42.0 gallons.

In contrast to these communities, there were 37 communities with populations of more than 1,200 inhabitants in which the rate for poliomyelitis for the decade was less than the rural-urban rate of 32 per 100,000 inhabitants. Nineteen of the communities with populations of 1,200–2,999 reported no cases, and in these localities the daily per capita water supply averaged 170.1 gallons. The other 18 communities, in which the population was 3,000 or more inhabitants and the rate for poliomyelitis was less than 32 per 100,000 (averaging 17.8), had an average daily per capita water supply of 101.4 gallons. The

low rate for paralysis in unincorporated communities with more than 500 inhabitants, which were usually industrial, was associated with an average per capita water supply of over 200 gallons daily. Inasmuch as the daily per capita water supply was for the most part independent of the size of the community, the data suggested the effect of large amounts of fluid as a dilution factor or a factor increasing the rate of flow (fig. 3).

SUMMARY

Poliomyelitis seemed to be widely distributed in Louisiana during the decade under investigation, but the preponderant incidence was in small towns. The question therefore arises as to whether the epidemicity of the disease during the past 50 years has not been influenced by the growing tendency of communities to liquefy excreta without making adequate provision for the disposal of the accumulated fluids.

The 64 incorporated places in Louisiana without community water supply and sewage disposal had 12 cases of poliomyelitis, or 39.7 cases per 100,000, which approximates the basal rural-urban rate. The 27 incorporated places in Louisiana with both water supply and sewerage system had a population of 691,881, and 184 reported cases of paralysis, a rate of 26.6 per 100,000 inhabitants. The 87 unincorporated places in Louisiana with water supply but no sewerage system had 120,811 inhabitants and 101 cases of paralysis, a rate of 83.6 per 100,000 inhabitants.

REFERENCES

(*1*) Casey, Albert E., and Broun, G. O.: Epidemiology of St. Louis encephalitis. Science, 88: 450–451 (1938).

(*2*) Paul, John R., Trask, James D., and Culotta, C. S.: Poliomyelitis virus in sewage. Science, 90: 258–259 (1939).

(*3*) Fisher, R. A.: Statistical Methods for Research Workers. 4th ed. Oliver and Boyd, London, 1932.

NATURAL INFECTION OF *TRIATOMA HEIDEMANNI* WITH *TRYPANOSOMA* CRUZI IN TEXAS[1]

By Ardzroony Packchanian, *Protozoologist, Division of Infectious Diseases, National Institute of Health, United States Public Health Service*

INTRODUCTION

Previously the writer has demonstrated the natural infection of *Triatoma gerstakeri* with *Trypanosoma cruzi* in the State of Texas (*10*). The object of the present communication is to show that *Triatoma heidemanni* ("bloodsucker," "Mexican bedbug," "kissing bug") is also naturally infected with *Trypanosoma cruzi* in Texas, and, therefore, that this blood sucking insect represents another potential vector for spreading Chagas' disease in man and in animals.

[1] The writer is indebted to Dr. Charles Philips and his colleagues at the Scott and White Clinics, Temple, Tex., for their aid during the collection of live *Triatoma heidemanni*.

Field studies.—In October 1937 and September 1938, the writer was sent by the Public Health Service to Temple, Tex., to investigate the epidemiological significance of *Triatoma heidemanni.* A single adult *Triatoma* previously received from there had been proved to be naturally infected with *Trypanosoma cruzi* (see fig. 1).

Over 150 insects collected at Temple, Tex., were identified by Mr. H. G. Barber, of the United States Department of Agriculture, as *Triatoma heidemanni* (*2, 5, 11*). These bugs were collected chiefly in homes in different sections of the city. The nymphs [2] were usually found in mattresses and bedding and occasionally on the wallpaper or between cracks of wood in bedrooms. Most homes in which the insects were located were fairly modern and the people living therein were of modest means. A few adults and two lots of nymphs were collected in fields.

Laboratory studies.—The technique used in this study has been described (*10*) and consists of (1) demonstration of natural infection of *Triatoma* with trypanosomes; (2) use of experimental animals and methods of inoculation; (3) microscopic examination of the blood for demonstration of infection of test animals; (4) staining of trypanosomes.

EXPERIMENTAL DATA

Natural infection of Triatoma heidemanni with trypanosomes.—About 65 percent of 150 *Triatoma heidemanni* collected during 1937 and 1938 in Temple, Tex., were found to be naturally infected with trypanosomes. All adults examined were infected. Five lots of nymphs representing 42 *Triatoma* collected in different homes were free from flagellates, while of 2 lots of *Triatoma* representing 6 adults and 44 nymphs collected in a cotton field near a farmhouse all were infected with trypanosomes.

Two adult *Triatoma heidemanni* found in Three Rivers, Tex., were likewise infected with trypanosomes. These two bugs were found among about 200 specimens of *Triatoma gerstakeri* collected during 1938 in the same locality.

The insects naturally infected with trypanosomes harbored the flagellates in their intestines and eliminated some of them in their fecal excretion. The flagellates were not found in the saliva of 10 adult *Triatoma heidemanni* examined. The parasite had the morphology of crithidia with long flagellum, herpetomonas, and slender metacyclic trypanosomes; all these forms were often found in the fecal material of both nymphs and adults. The forms of the trypanosomes observed in cover-glass and stained preparations were identical with

[2] The young *Triatoma*, which are known as nymphs, have no wings and cannot fly. They stay near or around a location where a supply of blood is available. The nymphal stage lasts several months. The nymphs then mature, acquire wings, and are able to fly. "Flying tick" stage lasts 1 or 2 months. The adult female lays eggs which hatch within 3 weeks. The adults are usually found in Texas during the months of May, June, July, and August. They are rarely found later.

similar preparations derived from naturally and experimentally infected *Triatoma megista* and *Triatoma gerstakeri* (*10*) and were infective to guinea pigs, mice, rats, and rhesus monkeys (see table 1).

TABLE 1.—*Cultural and microscopic findings in the animals inoculated with the intestinal contents of Triatoma heidemanni*

Key No.	Experimental animal	Source of inoculum	Microscopical examination for trypanosomes in blood: Number of days after inoculation	Microscopical examination for trypanosomes in blood: Results	Cultural attempts: Number of days after inoculation	Cultural attempts: Results	Autopsy findings: Number of days after inoculation	Autopsy findings: Degree of lymphocytic infiltration (myocarditis)	Autopsy findings: Leishmania-like *Tr. cruzi* in tissues
335-1a	*Mus musculus*	*Triatoma heidemanni* (Fecal material).	23	+	23	+	23	0	+
335-1b	do	do	13, 132, 184	+++	184	+	184	++	−
335-2	do	do	6, 160, 184	000	184	+	184	+	−
352-1a	do	*Mus musculus* 335-1a	108	+	108	+	108	++	−
352-1b	do	do	108	0	108	+	108	+	0
392-1a	do	Rhesus monkey 388-1	3, 11	00	11	+	11	+	−
392-1b	do	do	11, 202, 308	000	308	+	308	+++	−
399-2a	do	do	60, 139	00	139	+	139	+	−
1413-1a	do	*Triatoma heidemanni*	53	0	53	+	53	0	−
1413-1b	do	do	53, 68, 89	0+0	89	+	89	+	−
1419-4a	do	do	58, 63	00	63	+	63	0	−
1419-4b	do	do	58, 83	00	83	+	83	++	−
1455-4c	do	do	11, 24, 109	000	109	+	109	+++	−
1456-1b	do	do	3, 11, 24	000	24	+	24	0	−
1456-1c	do	do	11, 24, 109	000	109	+	109	+++	−
1461-1a	do	Rhesus monkey 1442-1	52, 282	+, 0	282	0	282	+++	−
1461-1b	do	do	52, 282	+, 0	282	0	282	+++	+
1504-2a	do	*Triatoma heidemanni*	59, 63, 100	0, +, 0	100	+	100	++++	+
1504-2b	do	do	59, 63, 169	0, 0, 0	169	0	169	++	−
1504-2c	do	do	59, 63, 169	0, 0, 0	169	+	169	+	−
1504-2d	do	do	59, 63, 169	0, 0, 0	169	?	169	+++	+
1505-1a	do	do	48	0	48	+	48	+	−
1505-1b	do	do	48	0	48	+	48	+++++	+
1505-1c	do	do	48	+	48	+	48	++++	−
1578-3a	do	do	30, 63	0, +	63	?	63	+	+
1578-4a	do	do	30, 63	0, +	63	?	63	++++	+
1578-4b	do	do	30, 63	0, 0	63	+	63	++++	−
1599-3	do	*P. eremicus* 1579-1	---	---	---	---	[1] 22	++	+
1579-1a	*P. eremicus*	*Triatoma heidemanni*	30	+	30	+	30	++++	−
1579-1c	do	do	30, 37, 63	+, +, 0	63	+	63	++	−
1598-1a	do	*P. eremicus* 1579-1	33	0	33	?	63	+	+
1599-2a	*P. leucopus noveboracensis.*	do	33	0	33	+	33	++	−
1599-2c	do	do	33	0	33	+	33	0	−
1599-1a	*P. polionotus polionotus.*	do	33	0	33	+	33	++	+
1600-1a	*Rattus norvegicus.*	do	7, 33	0, 0	33	+	33	++++	−
1600-1b	do	do	7, 33	0, 0	33	+	33	+	−
1600-1c	do	do	7, 33	0, 0	33	+	33	++	+
834-2	Guinea pig	*Triatoma heidemanni*	58	+	58	+	58	0	−
834-3	do	do	132, 275	0, 0	132, 275	+, +	275	0	−
1572-2	do	do	12, 170	0, 0	12, 170	+	170	++	−
1600-2a	do	*P. eremicus* 1579	127	0	127	+	127	++	−
1600-2b	do	do	127	0	127	+	127	---	---
388-1	Rhesus monkey	Culture from 334-2	12, 35, 165	+, +, 0	12, 35, 165	+++	165	++++	−
1442-1	do	Rhesus monkey 388-1	47, 60	+, +	47, 60	++	60	++++	−
1460-1	do	Rhesus monkey 1442-1	133	0	133	+	133	++	−
1597-3	do	*P. eremicus* 1579-1	127	0	127	+	127	---	---

[1] Dead.

Animal inoculations and demonstration of Trypanosoma cruzi in the blood of experimentally infected animals.—Sixty-eight susceptible animals were inoculated with the fecal material derived from seven

PLATE

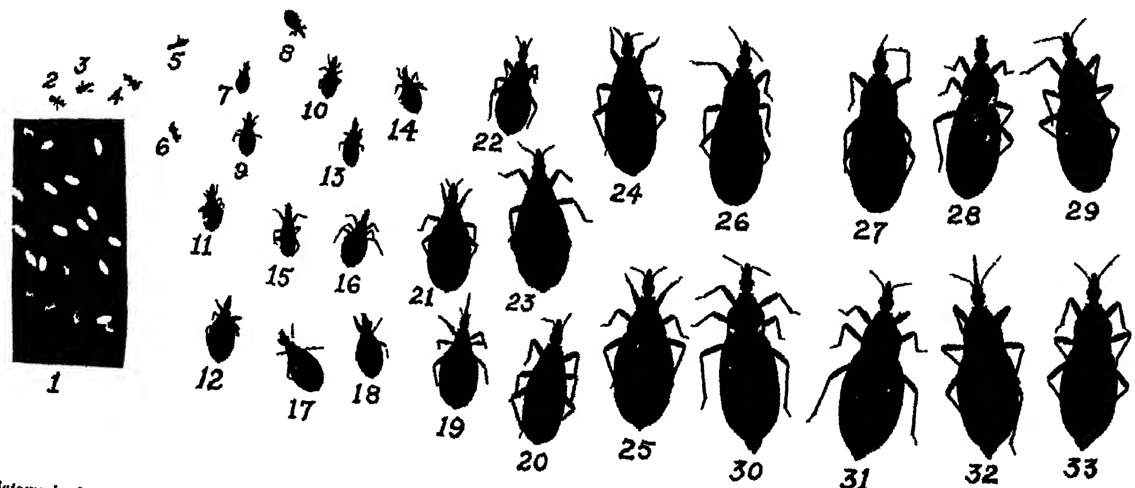

FIGURE 1.—*Triatoma heidemanni* (photographed natural size). 1. Eggs. 2 to 6 Youngny mphs 10 days old. 7 to 10. Young nymphs after feeding on animals. 11 to 18. Nymphs after second feeding. 19 to 25. Large nymphs engorged with blood. 20 to 29. Adult males. 30 to 33. Adult females.

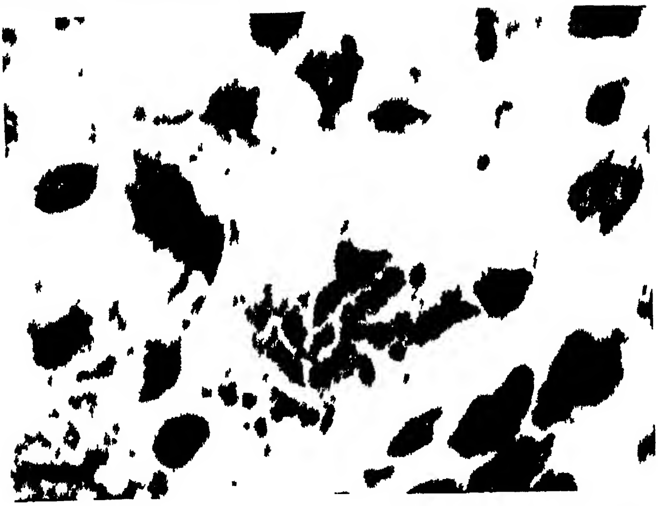

FIGURE 2.—(Photomicrograph) Intracellular form of segmenting *Trypanosoma cruzi* in fat cells from *Mus musculus* 335–1a (table 1). Note segmenting leishmania-like trypanosomes with round or ovoid pale basophilic macronuclei and densely basophilic rod-shaped blepharoplasts. Lillie's modification of Romanowsky's stain. (× 1600.)

groups of naturally infected *Triatoma heidemanni* or with the strains of trypanosomes isolated from these bugs. For the sake of brevity only 46 animal inoculations will be described in this communication, of which 34 are mice (28 *Mus musculus*, 3 *Peromyscus eremicus eremicus*, 2 *P. leucopus noveboracensis*, and 1 *P. polionotus polionotus*), 3 rats (*Rattus norvegicus*), 5 guinea pigs, and 4 monkeys (*Macacus rhesus*). Occasionally the blood of the inoculated animals was examined microscopically under cover glass (objectives Nos. 21 and 45, ocular 10X). Trypanosomes were seen in the blood of 15 out of 45 animals (table 1). The number of trypanosomes seen in any given preparation rarely exceeded 3 per microscopic field (45 x 10). Often over 5 minutes search was necessary in order to demonstrate a single trypanosome in a cover-glass preparation. Once about 5 trypanosomes were found in the blood of a mouse which had been inoculated with 0.3 cc. of a rich culture of *Trypanosoma cruzi*. The movements and the morphology of the trypanosomes in the peripheral blood of test animals were similar to those previously observed (*10*), which are characteristic of *Trypanosoma cruzi*.

Culturing trypanosomes in vitro.—Growth of trypanosomes resulted in 42 out of 49 cultural attempts; of the remaining 7 negative cultures, 4 were contaminated with bacteria. Trypanosomes were found by microscopic examination in the blood of only 8 animals (total of 10 tests) at the time blood was taken. No trypanosomes were demonstrated during 5 minutes of microscopic search in the blood of the remaining 31 animals (total of 32 tests) at the time of cultural attempts, yet rich cultures of trypanosomes (*in vitro*) were obtained from all of these animals. (See table 1.)

The cultural forms, crithidia, herpetomonas, metacyclic trypanosomes, dividing forms, and rosettes were similar in size, morphology, and movements to the forms found in a previous study (*10*). Monthly or bimonthly subcultures were made *in vitro* from each strain for several generations. Some of these strains have been kept *in vitro* on Novy and MacNeal's media for over a year (14 generations). They grow luxuriantly and form colonies on blood agar slants and produce typical infection in susceptible test animals. The cultural forms stain readily.

Gross and microscopic pathology.[3]—Among 64 inoculated animals, 1 mouse died after 22 days of illness (1599–3). The remaining 63 animals were sacrificed at various intervals; the minimum duration of infection was 11 days and the maximum 404 days. At autopsy no pronounced macroscopic changes were noted. The heart blood from each animal was introduced into N. N. tubes for cultural studies and

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[3] The writer is indebted to Dr. Ralph D. Lillie and Dr. L. L. Ashburn, Division of Pathology, for their cooperation in this work and reports of histopathological findings.

pieces of tissue and organs were fixed in 10 percent formalin, or occasionally in saturated solution of mercury bichloride containing 10 percent formalin or in 20 parts of formalin and 80 parts of 95 percent alcohol. These were sent to the Division of Pathology. After dehydration of tissues they were imbedded in paraffin and sections stained by Lillie's modification of Romanowsky's stain. All the slides were examined by either Dr. Ralph D. Lillie or Dr. L. L. Ashburn, and by the writer.

Leishmania-like segmenting trypanosomes were found in only 11 cases out of 64 autopsies. These forms were found usually in the cardiac muscle fibers in the atrium (7 cases), in skeletal muscles (3 cases), and in scattered fat cells (1 case). (See fig. 2.) The number of segmenting forms of *Trypanosoma cruzi* in a given cell varies from very few to many. These forms contain a round basophilic macronucleus and densely basophilic rod-shaped blepharoplasts. Lymphocytic infiltration, mostly in the atrium, was noted in 51 cases. Marked myocarditis was noted in 34 animals.

DISCUSSION

The flagellates found in *Triatoma heidemanni* produced infection in experimental animals similar to the infection produced by the strains of *Trypanosoma cruzi* isolated directly from human sources. The morphology and movements of the flagellates both *in vitro* and *in vivo* are also indistinguishable from known strains of *Trypanosoma cruzi* (*8*, *10*). From the experimental data on hand it is concluded that flagellates found in *Triatoma heidemanni* are *Tr. cruzi.* (See table 1.)

The present study shows also that cultural tests are most valuable in diagnosing *Trypanosoma cruzi* infections in experimental animals (*6*, *7*, *8*, *10*). Cultures give positive results even when one is unable to demonstrate a single trypanosome in peripheral blood after a long microscopic search. Positive cultures were obtained from about 85 percent of inoculated animals. (See table 1.) A few cultures which have been recorded as negative were contaminated with bacteria and molds. If Novy and MacNeal's media are prepared properly and care is taken to prevent evaporation of water of condensation from test tubes, nearly 100 percent positive cultures may be obtained.

Only 10 of 64 animals showed leishmania-like forms of trypanosomes in muscle fibers, but this finding is sufficient to conclude that trypanosomes isolated from naturally infected *Triatoma heidemanni* are capable of producing this condition in experimental animals. It was interesting to note that in one case leishmania-like forms of *Trypanosoma cruzi* were also found in the fat cells. (See fig. 2.)

There are about 15 species of *Triatoma* known to exist in the United States. Of these, 4 species, including *Triatoma heidemanni*, have been found naturally infected with *Trypanosoma cruzi* (*2*, *3*, *5*, *10*, *11*).

Triatoma heidemanni is already a "domesticated pest" in certain homes and causes discomfort to the inhabitants. These insects, collected in homes and in bedding, were all free from *Trypanosoma cruzi* infection, suggesting that the individuals from whom the bugs obtained blood were not infected. The *Trypanosoma cruzi* infection is not transmitted through the egg, and newly hatched nymphs are free from the infection. Such nymphs remain free from infection if they feed on normal individuals. *Triatoma* collected outside homes in Temple were found, however, to be infected with *Trypanosoma cruzi*. These bugs often get in homes during the months of May, June, and July, and thus represent a potential source of infection.

SUMMARY

1. The reduviid bug, *Triatoma heidemanni*, popularly known as "blood sucker," "Mexican bed bug," and "kissing bug," collected in or around dwellings in Temple, Tex., was found to be naturally infected with *Trypanosoma cruzi*. This blood-sucking insect has already become a household pest in certain localities and represents a potential vector for spreading Chagas' disease.

2. The strain of *Trypanosoma cruzi* collected in Temple produced infection in monkeys (*Macacus rhesus*), mice (*Mus musculus*), American deer mice (*Peromyscus eremicus eremicus*, *P. leucopus noveboracensis*, *P. polionotus polionotus*), rats (*Rattus norvegicus*), and guinea pigs.

3. Cultural tests proved to be very fruitful. Out of 49 cultural attempts from experimentally infected animals, 42 gave positive cultures *in vitro*. The subcultures of the Temple strain of *Trypanosoma cruzi* have been maintained *in vitro* for over a year and are still infective to susceptible test animals.

4. Sixty-four animals, which were inoculated with the intestinal contents of *Triatoma heidemanni* or trypanosomes derived therefrom, were sacrificed at various intervals. Histopathological studies in these animals revealed 11 cases of intracellular leishmania forms of *Trypanosoma cruzi*. These forms were found in cardiac muscle fibers (7 times), in skeletal muscles (5 times), and in scattered fat cells (once).

REFERENCES

(*1*) Chagas, C.: Nóva tripanosomiaze humana. Mem. Inst. Oswaldo cruz, Rio de Janeiro, **1**:159 (1909).

(*2*) Del Ponte, E.: Contribución al estudio del gen. *Triatoma* Lap. Rev. d. Inst. Bact., **2**: 133 (1921).

(*3*) Kofoid, C. A., and Whitaker, B. C.: Natural infection of American human trypanosomiasis in two species of cone-nosed bugs, *Triatoma protracta* Uhler and *Triatoma uhleri* Neiva, in the western United States. J. Parasitol., **22**: 259 (1936).

(*4*) Mazza, S.: Inexistencia de un sintoma patognomonico en formas agudas de enfermedad de Chagas. Prensa Medica Argentina, **26**: 1 (1939).

(5) Neiva, A., and Lent, H.: Notas e commentarios sobre triatomideos. Lista de especies e sus distribuicao geographica. Rev. de Entomol., **6**: 153 (1936).
(6) Novy, F. G., and MacNeal, W. J.: On the cultivation of *Trypanosoma brucei*. J. Infect. Dis., **1**: 1 (1904).
(7) Novy, F. G., and MacNeal, W. J.: On the trypanosomes of birds. J. Infect. Dis., **2**: 256 (1905).
(8) Packchanian, A.: On the cultivation of seven species of trypanosomes *in vitro*. Science, **80**: 407 (1934).
(9) Packchanian, A.: Agglutination and precipitation tests for the diagnosis of *Trypanosoma cruzi* infection (Chagas' disease). J. Immunol., **29**: 85 (1935).
(10) Packchanian, A.: Natural infection of *Triatoma gerstakeri* with *Trypanosoma cruzi* in Texas. Pub. Health Rep., **54**: 1547 (1939).
(11) Stål, C.: Monographie der Gattung Conorhinus und Verwandten. Berlin Entomol. Zeitschr., **3**: 111 (1859).

THE ISOLATION AND PATHOGENICITY OF *PITYROSPORUM OVALE*[1]

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A small yeast-like microorganism is almost always associated with the dry or greasy scales of seborrhea capitis or dandruff (fig. 2). It can, in fact, be found on the majority of "normal" scalps (*5*) and it is present on other skin surfaces. Rivolta (*14*) is credited by many investigators with being the first to describe this microorganism. It seems doubtful, however, whether the Cryptococcus which he found associated with psoriasis is the same. In the following year Malassez (*6*) described it, and it has been called the spore of Malassez. It is better known as the "bottle bacillus" and *Pityrosporum ovale*.

Although observers agree that *P. ovale* is usually found associated with seborrhea, they do not agree on its cultural characteristics or its etiologic significance. Since the careful but futile efforts of Sabouraud to obtain pure cultures of *P. ovale* many investigators have tried in vain to isolate this fungus. Many of them have observed some growth around the scales used as inoculum, but were unable to obtain subcultures, further growth being inhibited by an inadequate culture medium or by overgrowth of bacteria, yeast, or molds. The claims of some of those who believed they had successfully subcultured this delicate fungus have been later withdrawn or disproved. Attempts to stimulate growth by the addition of substances to the medium usually have not entirely overcome the difficulties encountered. Marzinowski and Bogrow (*7*), Meirowsky (*8*), and Krauss (*4*) added lanolin, and Templeton (*15*) added oleic acid to the media. Panja (*13*) isolated a fungus which he believed was *P. ovale* by placing infected scales on gentian violet glucose agar and then transferring them to 2 percent glycerin agar. Huang (*12*) isolated a strain on agar containing 8 percent glucose and 2 percent lecithin. Ota and Huang (*12*) isolated

[1] From the Division of Infectious Diseases, National Institute of Health.

a second strain on agar containing 10 percent glucose and about the same percentage of butter. Benham (*2*) tested a number of oily materials and found lanolin, oleic acid, and butter most effective in promoting growth.

Ota and Huang and Benham isolated and subcultured fungi which appear to be strains of *P. ovale*. Ota and Huang state that strains isolated by Acton and Panja and by Castellani (*3*) were essentially like their own. The other investigators mentioned, and others, probably also observed growth of the fungus in primary cultures, but were not successful in obtaining subcultures. In view of the recent studies of Benham, and of the studies reported here, the correct identification of some of the more easily cultured strains can well be questioned. The strains of Acton and Panja and of Castellani grew slowly on ordinary media after the first isolation. Some investigators have isolated larger yeast-like forms which are easily subcultured on any of the ordinary mycological media. The strain isolated by Moore (*9, 10*) and used in inoculation experiments to prove the pathogenicity of *P. ovale* grows readily and quickly on such media. Benham has identified this strain as a member of Group III of Cryptococcus. Species of Cryptococcus are known to be often on the skin.

Aside from the difficulty of obtaining pure cultures for use in experimental inoculations, there is another serious obstacle to obtaining convincing proof that *P. ovale* is pathogenic. It is normally present on nearly all scalps, and adequate fulfillment of Koch's postulates is therefore difficult. Those who claim to have produced seborrhea by experimental inoculation have specified that in order to produce lesions it was necessary in most cases to use individuals who already exhibited lesions of seborrhea, or who had the type of skin usually associated with seborrhea. Since such individuals almost certainly harbored *P. ovale* before the experimental inoculation, its demonstration after inoculation cannot be taken as proof either that the fungus which was used for inoculation produced the seborrhea, or that it was actually a culture of *P. ovale*.

It would appear that in most cases when *P. ovale* has been isolated, assuming that the microorganism obtained was correctly identified, the isolations were largely fortuitous, most attempted cultures yielding no growth or only contaminants. It is, therefore, of interest to report here a method of isolating *P. ovale* which is easy and dependable. Strains of this fungus have been isolated repeatedly by planting untreated scales from the scalp of an individual with seborrhea oleosa (*11*) in dextrose broth (pH 5.5) to which varying amounts of glycerin had been added. The glycerin broths were made up in flasks, tubed, sterilized in the autoclave, and planted by mixing the greasy scales from the scalp as thoroughly as possible with the broth. Growth of *P. ovale* in the lower concentrations of glycerin was inhibited by the

rapid growth of bacteria, but in 28 percent glycerin *P. ovale* grew well and bacterial growth was practically inhibited. Growth of *P. ovale* was not entirely inhibited until the concentration of glycerin reached 48 percent. Table 1 shows the estimated relative amounts of growth of *P. ovale* and of bacteria in various glycerin concentrations after 1 week's incubation at 30° C. Growth was much better at 30°–37° C. than at room temperature.

TABLE 1.—*Estimated relative growth of P. ovale and of bacteria on scales placed in different concentrations of glycerin, after 7 days incubation at 30° C. A small amount of growth was observed in 48 percent glycerin after 2 weeks' incubation*

Percent glycerin	*P. ovale*	Bacteria	Hyphomycete in one or more tubes	Percent glycerin	*P. ovale*	Bacteria	Hyphomycete in one or more tubes
17	++	++++	−	34	+++	−	+
20	+++	+++	+	36	+++	−	+
23	++++	+	+	40	+	−	+
26	++++	±	+	44	±	−	+
28	++++	−	+	48	−	−	−
30	+++	−	+	53	−	−	−
32	+++	−	+				

Growth of *P. ovale* was most easily demonstrated in and around very small scales which floated on the surface of the broth in a dust-like film, but the fungus also grew in the scales which settled to the bottom of the tube. It was at first supposed that the glycerin supplied a nutrient required in the metabolism of the fungus. Further studies indicated, however, that in these isolation cultures the nutrient requirements of the fungus were met by the scales used as inoculum. *P. ovale*, after isolation in pure culture, does not grow readily in any of the concentrations of glycerin found useful in its isolation. The important function of the glycerin is to inhibit the growth of contaminants, particularly of bacteria, which are not as tolerant as the fungus of these high glycerin concentrations. A similar use of glycerin broth may aid in the isolation of other fungi from mycoses. Experiments to test this are planned.

In the experiments made to determine the glycerin tolerance of *P. ovale*, the concentrations to be tested were set up and seeded from portions of the same inoculum in order to minimize differences. Several tubes of each concentration were planted. . A few tubes, after incubation, contained Hyphomycetes, growths of these molds appearing in concentrations of glycerin as high as 44 percent. Isolation of *P. ovale* was usually possible even in these contaminated tubes unless the mold produced sprout cells or a fragile, easily torn mycelium.

In view of the conflicting claims for success in subculturing *P. ovale*, proof of the correct identification of any isolate is necessary. Evidence that the yeast-like fungus isolated by this method is actually

P. ovale is supplied by its peculiar nutritional requirements; its morphological resemblance to the budding cells seen in scales from the scalp; and a series of observations, which can readily be made, and which reveal a continuity of development between the budding cells seen in the inoculum and those growing in the cultures (figs. 3–7).

The strains of *P. ovale* isolated by this method, like those isolated by Benham, grow very poorly or not at all on all ordinary media. They grow readily, however, when planted on slants of acid dextrose or wort agar over which an ether extract of either lanolin, oleic acid, or the scales from seborrhea has been pipetted as described by Benham (*2*). My strains have been compared with one which Dr. Benham kindly sent me as typical of hers, and with Dr. Moore's, to

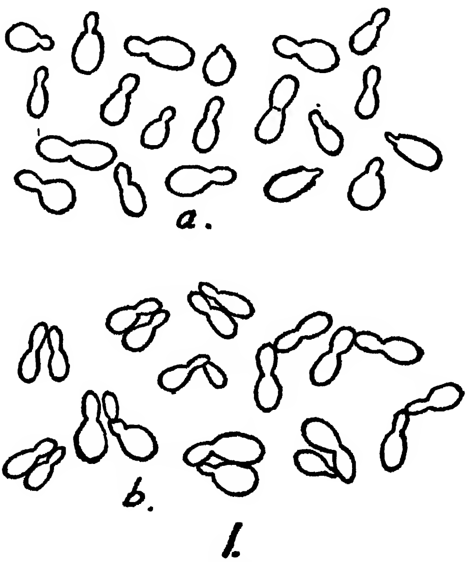

FIGURE 1.—Camera lucida drawings of young cultures of *P. ovale*. 1a, variety of forms found; 1b, tendency to lie side by side or with buds in contact. (×1400)

whom I am also indebted for a culture. The nutritional requirements of my strain are like those of Benham's. My strain grows more slowly and the cells are more uniformly oval and somewhat smaller, but it is probably cospecific with hers. Moore's strain is quite different. It is larger, mucoid, and grows readily on all ordinary media, although cultures are somewhat difficult to maintain unless transferred frequently.

The several strains isolated in glycerin broth have been identical. The cells are small (1.5–2.5 x 2–3.5μ), thin-walled, oval, and bud at one end (figs. 1a, 3, 7). They show a tendency to lie side by side or at an angle with buds in contact (fig. 1b). The position assumed suggests that there may be a conjugation of cells, but this has not

been actually demonstrated. The primary cultures on glycerin broth and, to a slighter extent, subcultures on agar produce a not unpleasant fruity odor suggesting butyl acetate, and similar to that sometimes detectable from the scalp. It is apparently a volatile substance formed through the utilization by *P. ovale* of the fats or fatty acids in the inoculum and on the agar.

Besides the fact that the strains isolated in glycerin broth cannot be subcultured on ordinary media but will grow only when transferred to media covered with a film of some suitable fatty material, and besides the morphological similarity between the fungus isolated in culture and that seen in the scales, a further and perhaps more convincing proof of the identity of the isolate is furnished by following the development of the cells seen in the inoculum. Collected scales are mixed in order to make the inoculum as nearly uniform as possible, and tubes of 23–40 percent glycerin broth are heavily seeded with these scales. An immediate microscopic examination made by mounting some of the scales in broth under a cover slip shows that numerous cells of *P. ovale* are present (fig. 3). The apparent size in glycerin broth is slightly larger (1.5–2.5 x 3.5μ, exclusive of buds) than in xylol, although the cells are not so easily seen. If samples of the inoculum are now examined at intervals of a few hours an increase in numbers of these cells can be clearly demonstrated. The increasing numbers appear at innumerable points *in situ* in the scales, indicating that the microcolonies which develop after a few days around the scales come from the cells of *P. ovale* which were numerous on the scales, and do not arise by the proliferation of one or a few cells of a contaminating yeast which might have been present. Nearly all the small scales which float on the surface of the broth thus become nuclei of microcolonies of actively budding cells.

When the inoculum is examined after 24 to 36 hours incubation many of the individual scales are surrounded, when crushed under a cover slip for microscopic examination, by an oily substance in which an increased number of the cells of *P. ovale* can be seen (fig. 6). Some of the smaller scales have closely associated microcolonies of the organism (fig. 4). After 4 or 5 days incubation the microcolony increases greatly in size, but the scale about which the growth centers can still be seen (fig. 5). In older primary cultures further proliferation of the cells is apparent (fig. 7). These budding cells almost exactly resemble those seen on the original scales, they are only slightly larger, and when transferred to agar media which has become somewhat dry before use, there appears to be no difference in size or appearance. Subcultures are best made by grinding some of the primary culture with broth in a mortar and pipetting onto the previously prepared agar slants.

FIGURE 2 *P ovale* in defatted, heat fixed and methylene blue stained scales from seborrhea (× 900)

FIGURE 3 —*P ovale* in a scale a few hours after planting and before there has been any increase in numbers Note the apparent increase in size in 25 percent glycerin broth (× 900)

FIGURE 4 —A microcolony of *P ovale* after 54 hours incubation showing a close association with the epithelial scale (× 900)

FIGURE 5 —A microcolony of *P ovale* surrounding an epithelial scale after 18 hours incubation The size of the colony which can be demonstrated at this stage depends upon the number of *P ovale* cells in the scale when planted, and the number detached when mounting, as well as upon the time of incubation (× 900)

FIGURE 6 —Oily material exuding from epithelial scales incubated 48 hours The scales were placed in a drop of the broth on a slide and flattened under a cover slip The oily fringe contains a few droplets and numerous cells of *P ovale* displaced when the scale was crushed (× 100)

FIGURE 7 —Primary culture of *P ovale* after 5 days incubation (× 900)

Attempts were made to determine whether *P. ovale* is pathogenic. The fungus ordinarily does not penetrate to the deeper layers of the skin, being found principally in the horny layers and the superficial layers which line the hair follicle. It should, therefore, be possible to simulate natural infection most closely by thoroughly rubbing a culture into the skin. It is desirable to avoid the trauma incident to intracutaneous injection or scarification because these operations usually result in some scaling and increase in pigmentation. It was further recognized that *P. ovale* is almost universally present on the skin areas subject to seborrhea. Therefore, instead of trying to find and experimentally infect an individual who did not already carry the fungus it was decided to inoculate a seborrheic individual and to measure any noticeable increase in the time required to develop seborrhea in the area inoculated as compared with an uninoculated area. The entire scalp was thoroughly cleaned and a culture from an agar slant covered with a film of lanolin was removed and rubbed vigorously into areas on the scalp and over the shoulders. Lesions of seborrhea did not appear in the inoculated areas over the shoulders, and did not appear any sooner in the inoculated areas on the scalp than in the control areas. These experiments were repeated, but no pathogenic properties of the fungus could be demonstrated. Although some features of seborrhea seem consistent with a parasitic etiology, the failure of these experimental inoculations would give support to the contentions of many dermatologists and medical mycologists, that *P. ovale* is a saprophyte, especially adapted to growth on the skin, but without etiologic significance in seborrhea.

SUMMARY

P. ovale was repeatedly and easily isolated by planting scales from seborrhea oleosa in acid dextrose broth containing 23 to 44 percent glycerin and incubating at 30°–37° C. Subcultures were successfully carried on media prepared by pipetting ether extract of lanolin, oleic acid, or seborrheic scales over agar slants, as described by Benham.

Evidence that the organism was actually *P. ovale* was furnished by the necessity for using special media, the resemblance of the fungus in culture and in the skin, and a series of observations of the inoculum which showed a continuity of development of the cells of *P. ovale* in the scales.

REFERENCES

(*1*) Acton, H. W., and Panja G.: Seborrhoeic dermatitis or Pityriasis capitis: A lesion caused by the Malassezia ovale. Ind. Med. Gaz., **62:** 603–614 (1927).

(*2*) Benham, R. W.: The cultural characteristics of *Pityrosporum ovale*—a lipophylic fungus. J. Invest. Dermatol., **2:** 187–203 (1939).

(3) Castellani, A.: Note on three new yeast-like organisms and a new bacillus, etc. J. Trop. Med. and Hyg., 28: 217–223 (1925).
(4) Krauss, A.: Ueber das Wesen des sogenannten Unnaschen Flaschenbazillus. Arch. f. Dermatol. u. Syph., 116: 723–736 (1913).
(5) MacKee, G. M., Lewis, G. M., Spence, M. J., and Hopper, M. E.: Dandruff and seborrhea. I. Flora of "normal" and diseased scalps. J. Invest. Dermatol., 1: 131–139 (1938).
(6) Malassez, L.: Note sur le champignon du pityriasis simplex. Arch. de Physiol., 1: 451–464 (1874).
(7) Marzinowski, E. J., and Bogrow, S. L.: Die Blastomyceten und ihre Beziehung zu Hautkrankheiten. Arch. f. Dermatol. u. Syph., 86: 215–238 (1907).
(8) Meirowsky, E.: Ueber das Wesen der Unnaschen Flaschenbazillen und ueber den feineren Bau einiger Hautpilze. Arch. f. Dermatol. u. Syph., 108: 129–140 (1911).
(9) Moore, M.: LXVIII. Cultivation and study of *Pityrosporum ovale*, the so-called bottle bacillus of Unna. Arch. Dermatol. and Syph., 31: 661–671 (1935).
(10) Moore, M., Kile, R. L., Engman, M. F., Jr., and Engman, M. F.: LXXII. *Pityrosporum ovale* (bottle bacillus of Unna, spore of Malassez). Arch. Dermatol. and Syph., 33: 457–471 (1936).
(11) Ormsby, O. S.: Diseases of the Skin. Lea and Febiger, Philadelphia, 1937. P. 1150.
(12) Ota, M., and Huang, Ping-Ting: Sur les champignons du genre Pityrosporum Sabouraud. Ann. Parasitol. hum. et comp., 11: 49–69 (1933).
(13) Panja, G.: The Malassezia of the skin, their cultivation, morphology and species. Trans. Far Eastern Assoc. Trop. Med., 2: 442–456 (1927).
(14) Rivolta, S.: Parassiti vegetali. Torino, 1873. Pp. 469–470.
(15) Templeton, H. J.: A study of dandruff and of the Pityrosporon of Malassez. Arch. Dermatol. and Syph., 14: 270–279 (1926).

CHIGGER MITES*

Chigger mites or "chiggers"[1] are the larval forms of various species of mites belonging to the family Trombidiidae, commonly known as harvest mites. Many different species of chiggers are known to attack vertebrate hosts, but only two chigger mites attacking man have been recognized from the United States, one, the common North American chigger,[2] and the other a closely related form found in the northern part of the Mississippi Valley.

Description and distribution.—The chigger or larva of the common North American species is oval, bright red, and, as in the first or larval stage of all mites, possesses only 3 pairs of legs. In the unfed

*A leaflet on this subject is available and may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

[1] The term "chigger," with variations in spelling (chigoe, jigger, etc.), is also applied to a tropical flea, *Tunga penetrans*, but generally in this country the term is used to designate the larval forms of the trombidiid mites.

[2] Our common North American chigger attacking man is now known under the scientific name of *Leptus rileyi* Oudemans, 1939. In order to aid the reader in tracing the species under its scientific name in both medical and zoological literature, a list of synonyms follows:

Leptus irritans Riley, 1873 (not *Leptus irritans* Lucas, 1847).
Tetranychus tlalsahuate Murray, 1877 (in part).
Trombidium irritans (Riley) Brumpt, 1910.
Trombicula cinnabaris Ewing, 1920.
Leptus similis Hirst, 1921.
Trombicula irritans (Riley) Ewing, 1925.
Trombicula alfreddugèsi (Oudemans, 1910) of Ewing, 1933.
Eutrombicula alfreddugèsi (Oudemans, 1910) of Ewing, 1938.

condition it measures about 150 microns in width, and is scarcely visible to the naked eye. The legs and surface of the body are covered by numerous feathered hairs. The mouthparts consist of a pair of hooked and ventrally barbed fingerlike mandibles, and 2 five-jointed palpi, each of which is provided with a claw divided into 2 prongs at the tip. The adult is a large red hairy mite, with the usual 4 pairs of legs, and with a marked constriction in the anterior portion of the body. Unlike the larval form it is not parasitic but is a scavenger, living largely on the fecal matter of arthropods and on woody decaying substances. Eggs are laid in the ground and the chiggers hatch in the spring soon after warm weather begins.

Chiggers have a widespread distribution in the United States, occurring from Long Island to Mexico and from the Atlantic coast to the Rocky Mountains. They have been found in low lands and well up in the mountains wherever there is rough growth of weeds and shrubbery. They may be encountered from the latter part of April until the last of October, depending upon conditions of temperature and moisture. In the southern United States they may begin to cause annoyance early in May, while in the northern part of their range they seldom appear before the middle of June.

The North American chigger is not only a pest of man but it has been reported as attacking a wide range of vertebrates, including domestic animals, small mammals, birds, and reptiles. It is an important pest of poultry, frequently causing the death of young chickens.

Method of attack.—Chiggers attach themselves to the surface of the skin by means of their mouthparts and feed much as do ticks. They apparently feed upon epidermal tissue liquefied by a secretion which they themselves inject into the skin. When they become fully engorged they drop off. The localization of chigger attachment, to quote one author, is determined by two factors, the tightness of the clothing at certain parts of the body and the thickness of the skin. Experiments by the same writer have shown that chiggers attack by preference where the skin is very thin and the flesh wrinkled or tender. Because of their size, 150 microns in width before they have become engorged, chiggers are unable to enter the pores of the skin (which range from 20 to 50 microns in diameter), but they frequently attach at the mouth of hair follicles. Although it is widely believed that chiggers burrow into the skin and embed their entire body, this method of attack must be extremely uncommon; they would be unable to accomplish such an invasion except in instances where a large enough opening in the skin was already present.

Symptoms.—An intense itching, apparently due to the liquefying secretion injected by the chigger, develops within the first 24 hours after exposure, and this is followed by a breaking out of wheals or

papules surrounded by an inflamed area. The papules may be surmounted by a pinhead-sized vesicle containing clear fluid. The itching generally reaches its maximum on the second or third day, then gradually subsides, though it may persist intermittently for several weeks. Scratching may be followed by secondary infection. If the lesions are numerous, fever, headache, and temporary nervous upset may result, and the intense pruritus may lead to loss of sleep and digestive disturbances. In this country chiggers are not known to transmit any disease, but in the Orient an allied species has been shown to be the carrier of pseudotyphus or Japanese river fever.

Treatment and prevention.—If it is known that there has been exposure to chiggers the skin should be examined, preferably with a hand lens, for the active larvae. However, they are so minute and they move so rapidly over the surface of the skin before attachment that it is difficult to capture them. An application of kerosene or 95 percent alcohol will kill the larvae quite rapidly. As soon as possible after exposure, it is advantageous to apply a thick lather of soap to the affected parts, allowing it to remain for 10 minutes or more before bathing. Even though the larvae may be removed or killed soon after attachment, usually enough secretion has been introduced into the skin to cause the characteristic itching lesion, and for this there is no known specific remedy. The intense itching may be temporarily relieved by ammonia or strong salt water, or a calomel phenol lotion. Collodion with metaphen applied to the lesions is recommended both to relieve the itching and to prevent infection.

In the summer and early fall when it is necessary to go into fields of tall weeds or grass, into berry patches, or wherever there is heavy undergrowth, an efficacious measure to prevent attack by chiggers is the liberal sprinkling of the stockings and underclothing with flowers of sulfur. Some authors have stated that the spraying of the shoes, stockings, and trouser legs with one of the proprietary fly-repellant preparations is successful in warding off attacks by chiggers.

REFERENCES

Ewing, H. E.: Studies on the biology and control of chiggers. U. S. Dept. Agric. Bull. No. 986, pp. 1–19 (Dec. 3, 1921).

Ewing, H. E.: The scientific name of the common North American chigger preoccupied. Proc. Helminthol. Soc. Wash., 5: 26–27 (January 1938).

Ewing, H. E.: A key to the genera of chiggers (mite larvae of the subfamily Trombiculinae) with descriptions of new genera and species. J. Wash. Acad. Sci., 28:288–295 (June 15, 1938).

Feng, L. C., and Hoeppli, R.: On some histological changes caused by mites. Chinese Med. J., 47: 1191–1199 (1933).

Howard, C. W.: A preliminary report on the Trombidiidae of Minnesota. 17th Rept. State Ent. of Minn., pp. 111–144 (1918).

Parkhurst, Howard J.: Trombidiosis (infestation with chiggers). Arch. Dermatol. and Syph., 35: 1011–1034 (June 1937).

Riley, Wm. A., and Johannsen, O. A.: Medical Entomology. 2d ed.; pp. 41–46 (1938).

The expulsion of droplets in an unstified sneeze. (Photograph reproduced by permission of the Department of Biology and Public Health, Massachusetts Institute of Technology.)

PHOTOGRAPH OF A SNEEZE

Sanitarians have long known that certain diseases are spread by the discharges from the mouth and nose, and that droplet infection plays a role in the dissemination of pathogenic microorganisms. They have also known that such microorganisms may be discharged into the air in greater numbers and to greater distances by the uncovered cough and sneeze than in ordinary breathing. But since such droplets are not visible under ordinary conditions, the risks of infection by this means have not been fully appreciated by the public, and the precautionary warnings of health officers to "cover your cough and your sneeze" are not generally heeded.

If any one has failed to appraise fully the potential danger of spreading infection to others by an uncovered sneeze, he has only to study the accompanying photograph, taken by Prof. M. W. Jennison, of the Department of Biology and Public Health, Massachusetts Institute of Technology, which shows the expulsion of droplets in a violent, unstifled act of sneezing.

According to Dr. C. E. Turner, who furnished the photograph, the picture was taken by the technique of ultra high-speed photography, which substitutes an instantaneous flash of light for the opening and closing of the camera shutter. This stroboscopic light illuminates the object to be photographed with an intense flash of short duration, the light being placed in such a position in this picture as to illuminate the droplets with a dark-field effect, so that they stand out sharply even in daylight and give photographic images larger than actual droplet size. The time of exposure was about 1/30,000 of a second.

In such a sneeze as that illustrated here, the droplets are numbered in the thousands, varying with the intensity of the expiratory effort. The number of bacteria dispersed in a sneeze may also be very large. It is stated that most of the droplets are under 2 mm. in diameter and that many are less than 0.1 mm.

The "muzzle velocity" of some droplets is said to be as great as 150 feet a second, and large droplets may be expelled to a distance of 12 feet, although the majority do not travel more than 2 or 3 feet. The involuntary closing of the mouth near the end of a sneeze tends to form a restricted orifice, resulting in the production of more and smaller droplets, which probably come largely from the saliva in the front of the mouth. Also it is apparent from the photograph that the number of droplets issuing from the nose in an unstifled sneeze is insignificant as compared with the number expelled from the mouth. As stated by Jennison and Edgerton,[1] these observations are

[1] Droplet infection of air: High-speed photography of droplet production by sneezing. By M. W. Jennison and H. E. Edgerton, Massachusetts Institute of Technology. Proc. Soc. Exp. Biol. and Med., 43: 455–458 (March 1940).

probably important in relation to infectivity, because of the differences in the microbic flora of the two regions.

Some droplets fall to the floor or ground, while others evaporate, leaving their bacteria suspended in the air, through which they may be disseminated by air currents.

The bacteriologic and epidemiologic aspects of infection of the air were discussed in a recent article by Wells, Wells, and Mudd,[2] who conducted experiments on the concentration of microorganisms in the air. They state that "the numbers of streptococci characteristic of the nasopharynx indicate a hazard of respiratory infection and have a sanitary significance comparable with the presence of *Escherichia coli* in drinking water." They estimate that several thousand nasopharyngeal streptococci per sneeze are contributed to the atmosphere and that "the sneeze thus almost seems to be a provision of nature for the survival of nasopharyngeal parasites. Even where the manifestations of a disease do not provide for the wide autodissemination of the infection through the air it has been observed that an outbreak of colds will be followed by the rapid spread of contagion. Sneezing induced by pollens might conceivably facilitate the spread of nasopharyngeal infection * * *."

Although much is yet to be learned experimentally regarding the physical and other characteristics of expiratory droplets which are factors in determining more accurately the role of droplet transmission in those communicable diseases that are spread by nose and mouth discharges, there can be no question that covering the mouth in coughing and sneezing is an important preventive measure with respect to such diseases.

COURT DECISION ON PUBLIC HEALTH

City ordinance regulating closing hour of barber shops held invalid.—(South Dakota Supreme Court; *City of Huron* v. *Munson,* 289 N. W. 416; decided December 26, 1939.) A complaint, which charged a violation of an ordinance of the city of Huron regulating the hour of closing of barber shops within the city, was dismissed by the trial court, and the city appealed. The power to regulate the business of barbering was not expressly granted to the municipalities of the State, but there was a grant of power to protect the public health. The supreme court said that, if it were conceded that certain general grants of power permitted the regulation of barbering by a city as a means of safeguarding the public health, it did not necessarily follow that the city could regulate the hours during which that business could be carried on. It was pointed out that any such regulation, to come

[2] Infection of air. Bacteriologic and epidemiologic factors. By W. F. Wells, M. W. Wells, and Stuart Mudd. Am. J. Pub. Health, 29: 863-890 (August 1939).

within the scope of the grant of power to protect the public health, had to be reasonable and, to qualify as reasonable, had to contribute in some real and substantial measure to the object sought to be accomplished by the grant of power. Continuing, the court said: "The conceded grant of power has as its purpose the protection of public health. We are convinced that the hour of closing a barber shop bears no real or substantial relation to that purpose, and that such a regulation contained in a city ordinance is therefore invalid as beyond the scope of the power granted by the legislature."

DEATHS DURING WEEK ENDED JULY 6, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 6, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,116	7,142
Average for 3 prior years	7,394	
Total deaths, first 27 weeks of year	238,492	236,561
Deaths under 1 year of age	436	444
Average for 3 prior years	513	
Deaths under 1 year of age, first 27 weeks of year	13,669	14,022
Data from industrial insurance companies:		
Policies in force	65,119,180	67,112,141
Number of death claims	8,858	8,512
Death claims per 1,000 policies in force, annual rate	7.1	6.6
Death claims per 1,000 policies, first 27 weeks of year, annual rate	10.1	10.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 13, 1940

Summary

The incidence of poliomyelitis continues to attract interest despite the favorable trend that has been evidenced throughout the current season. A report of 101 cases for the week ended July 13 compares favorably with 143 cases for the corresponding week in 1939 which was also the median week for the 1935–39 period. For the current week California reported 27 cases and Washington 17. The other 57 cases were scattered among 23 States.

Typhoid fever increased from 215 cases for the preceding week to 238 cases, the largest numbers being reported from Arkansas, Louisiana, and Texas. The typhoid trend for 1940 has been below the seasonal expectancy and lower than the 1939 incidence for each week of the year.

Slight increases were noted in the incidence of diphtheria, influenza, measles, meningitis, scarlet fever, smallpox, and whooping cough; however, with the exception of measles, the incidence of all the common communicable diseases was below the 1935–39 median figure for the corresponding week.

Eighteen cases of Rocky Mountain spotted fever were reported, of which 17 were in the Central and Eastern States. The 34 cases of typhus fever reported were scattered among 8 South Atlantic and South Central States.

Telegraphic morbidity reports from State health officers for the week ended July 13, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 13, 1940	July 15, 1939		July 13, 1940	July 15, 1939		July 13, 1940	July 15, 1939		July 13, 1940	July 15, 1939	
NEW ENG.												
Maine	1	1	1	------	------	------	141	50	50	0	0	0
New Hampshire	0	1	0	------	------	------	0	7	3	0	0	0
Vermont	0	1	0	------	------	------	8	76	37	0	0	0
Massachusetts	2	3	4	------	------	------	774	410	217	0	1	1
Rhode Island	0	1	1	------	------	------	59	52	17	0	0	0
Connecticut	0	0	3	1	2	1	8	108	53	0	0	0
MID. ATL.												
New York	15	21	26	[1] 2	[1] 6	[1] 3	681	840	1,066	1	0	10
New Jersey [2]	9	7	7	4	------	2	749	20	247	0	0	1
Pennsylvania	9	22	17	------	------	------	245	66	480	1	4	3
E. NO. CEN.												
Ohio	8	6	13	6	13	7	12	77	233	0	2	3
Indiana	2	10	9	------	12	8	9	6	10	1	4	1
Illinois [2]	25	17	22	2	10	10	256	23	91	0	0	4
Michigan [3]	1	6	14	6	------	------	370	98	137	1	0	1
Wisconsin	0	1	3	9	14	14	621	190	190	2	0	0
W. NO. CEN.												
Minnesota	1	1	2	------	1	1	18	29	53	0	0	0
Iowa	0	4	4	3	1	------	35	55	15	1	0	0
Missouri	0	3	9	------	------	27	2	3	16	0	0	1
North Dakota	0	2	1	------	64	9	0	39	8	0	0	1
South Dakota	0	1	2	------	------	------	0	15	3	0	0	0
Nebraska	1	4	2	------	------	------	13	8	8	1	0	0
Kansas	4	0	3	1	------	2	53	10	10	1	0	1
SO. ATL.												
Delaware	0	0	1	------	------	------	0	1	2	0	0	0
Maryland [2,3]	0	2	3	1	5	2	4	27	27	0	0	3
Dist. of Col [2]	5	5	6	------	1	------	1	35	33	0	0	0
Virginia [2]	4	11	7	36	19	------	36	91	60	1	3	4
West Virginia [3]	2	3	3	2	11	7	6	2	28	2	0	1
North Carolina [2,4]	2	7	10	------	1	1	48	82	82	1	2	3
South Carolina [4]	3	6	3	105	84	40	6	8	8	0	2	1
Georgia [4]	2	10	9	28	26	------	15	15	0	0	0	1
Florida [4]	3	2	3	2	7	------	16	11	8	0	1	1
E. SO. CEN.												
Kentucky	1	4	4	4	------	2	42	2	15	1	3	2
Tennessee	2	3	3	12	13	9	25	22	19	1	0	2
Alabama [4]	1	10	10	7	9	9	53	8	10	1	0	0
Mississippi [3,4]	8	3	3	------	------	------	------	------	------	0	0	1
W. SO. CEN.												
Arkansas	2	5	5	1	6	4	16	23	6	1	2	2
Louisiana [4]	4	4	7	10	31	18	1	------	9	1	1	1
Oklahoma [2]	4	1	3	13	3	7	4	20	14	1	0	0
Texas [4]	13	26	20	44	87	67	125	85	76	1	0	2
MOUNTAIN												
Montana [2]	0	0	1	------	------	------	22	29	20	0	1	0
Idaho	1	0	0	------	------	1	12	2	5	0	0	0
Wyoming	0	0	0	------	------	------	12	21	2	0	0	0
Colorado [5]	5	5	3	------	------	------	10	16	20	0	0	0
New Mexico	0	0	0	------	------	------	10	4	5	0	0	0
Arizona	0	0	1	24	10	9	41	4	5	0	0	0
Utah [3]	0	1	1	------	------	------	69	24	24	0	0	0
PACIFIC												
Washington	1	0	0	------	------	------	48	868	92	0	0	0
Oregon	1	1	1	1	6	4	35	61	18	0	0	0
California	10	21	20	5	17	17	129	479	397	2	1	3
Total	152	242	307	329	459	374	4,840	3,622	3,912	22	27	79
28 weeks	8,050	10,666	12,796	167,313	150,230	140,743	217,367	342,249	342,249	992	1,232	3,795

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 13, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 13, 1940	July 15, 1939		July 13, 1940	July 15, 1939		July 13, 1940	July 15, 1939		July 13, 1940	July 15, 1939	
NEW ENG.												
Maine	0	0	0	3	56	10	0	0	0	2	0	1
New Hampshire	0	0	0	1	0	3	0	0	0	0	1	0
Vermont	0	0	1	2	1	2	0	0	0	0	6	1
Massachusetts	0	1	1	66	51	66	0	0	0	2	4	3
Rhode Island	0	0	0	4	0	6	0	0	0	2	0	0
Connecticut	2	0	0	26	13	13	0	0	0	5	3	3
MID. ATL.												
New York	1	6	6	181	103	155	0	0	0	1	13	14
New Jersey [2]	0	2	2	110	31	31	0	0	0	8	6	6
Pennsylvania	0	0	0	120	98	144	0	0	0	14	6	14
E. NO. CEN.												
Ohio	1	5	1	52	91	91	0	12	0	6	9	12
Indiana	3	1	1	7	18	23	1	2	2	0	8	8
Illinois [2]	0	5	5	206	69	87	1	3	11	9	25	23
Michigan [3]	4	5	2	102	85	129	0	1	1	6	1	8
Wisconsin	1	2	0	53	42	66	2	0	5	0	0	1
W. NO. CEN.												
Minnesota	0	6	1	24	13	34	0	2	6	3	0	0
Iowa	5	0	0	10	13	19	11	13	6	1	2	2
Missouri	0	1	1	5	8	19	1	3	5	4	5	11
North Dakota	0	2	0	3	2	10	5	2	2	1	0	0
South Dakota	0	0	0	5	4	4	16	7	5	0	0	0
Nebraska	0	1	0	3	5	5	1	3	3	1	0	1
Kansas	4	0	0	25	23	27	0	1	3	1	0	5
SO. ATL.												
Delaware	1	0	0	3	2	2	0	0	0	0	1	1
Maryland [2 3]	0	0	0	7	16	16	0	0	0	4	2	12
Dist. of Col [3]	0	0	0	8	1	3	0	0	0	0	4	3
Virginia [2]	1	1	3	10	14	8	0	0	0	8	37	18
West Virginia [3]	2	0	0	16	9	12	0	0	0	5	17	9
North Carolina [2 4]	2	3	3	16	9	15	1	2	0	4	19	21
South Carolina [4]	3	20	1	0	1	2	0	0	0	10	21	21
Georgia [4]	0	5	1	4	1	5	0	0	0	15	24	39
Florida [4]	0	3	0	2	5	2	0	0	0	4	1	1
E. SO. CEN.												
Kentucky	3	3	1	14	4	10	0	0	0	8	37	37
Tennessee	0	2	7	5	15	4	0	0	0	3	32	42
Alabama [4]	5	2	3	10	10	10	1	0	0	2	13	20
Mississippi [3 4]	0	0	1	1	2	3	0	0	0	5	9	11
W. SO. CEN.												
Arkansas	2	1	0	5	1	6	0	1	0	25	13	23
Louisiana [4]	3	1	1	6	7	6	0	0	0	22	40	21
Oklahoma [3]	2	1	1	3	5	7	2	0	1	8	20	20
Texas [4]	7	15	1	8	17	17	3	0	0	33	30	30
MOUNTAIN												
Montana [3]	1	0	0	3	8	8	1	0	1	1	1	1
Idaho	0	0	0	0	2	3	0	0	2	0	2	2
Wyoming	0	0	0	3	7	5	0	2	2	0	0	0
Colorado [5]	0	1	0	16	9	21	1	2	3	2	5	2
New Mexico	1	1	0	1	4	5	0	0	0	1	6	5
Arizona	0	1	0	1	1	2	0	2	0	5	2	4
Utah [3]	1	1	0	4	4	9	0	0	0	0	1	1
PACIFIC												
Washington	17	0	0	14	5	14	1	1	4	3	2	2
Oregon	2	0	0	4	5	10	1	1	3	1	2	3
California	27	45	19	53	66	80	0	14	7	3	7	11
Total	101	143	143	1,225	956	1,391	49	74	103	238	437	520
28 weeks	945	1,020	1,020	115,292	112,675	160,214	1,843	8,454	7,557	3,099	4,601	4,839

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 13, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, week ended July 13, 1940	Whooping cough, week ended July 15, 1939
NEW ENG.		
Maine	12	26
New Hampshire	0	0
Vermont	16	47
Massachusetts	105	140
Rhode Island	2	31
Connecticut	63	53
MID. ATL.		
New York	265	413
New Jersey [2]	142	239
Pennsylvania	357	438
E. NO. CEN.		
Ohio	270	524
Indiana	12	98
Illinois [2]	157	362
Michigan [3]	261	181
Wisconsin	108	212
W. NO. CEN.		
Minnesota	43	35
Iowa	7	34
Missouri	33	36
North Dakota	9	58
South Dakota	6	3
Nebraska	6	34
Kansas	61	22
SO. ATL.		
Delaware	11	7
Maryland [2] [3]	144	65
Dist. of Col [2]	13	38
Virginia [2]	110	58
West Virginia [3]	91	8
SO. ATL.—continued.		
North Carolina [2] [4]	121	274
South Carolina [4]	15	18
Georgia [4]	20	34
Florida [4]	10	33
E. SO. CEN.		
Kentucky	92	44
Tennessee	48	130
Alabama [4]	17	21
Mississippi [3] [4]	-------	-------
W. SO. CEN.		
Arkansas	36	15
Louisiana [4]	64	159
Oklahoma [2]	19	4
Texas [4]	210	115
MOUNTAIN		
Montana [2]	8	6
Idaho	14	0
Wyoming	6	1
Colorado [5]	11	38
New Mexico	18	19
Arizona	0	0
Utah [3]	117	76
PACIFIC		
Washington	65	17
Oregon	28	20
California	242	100
Total	3,465	4,295
28 weeks	90,001	109,344

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended July 13, 1940, 17 cases as follows: New Jersey, 2; Illinois, 2; Maryland, 2; District of Columbia, 1; Virginia, 3; North Carolina, 3; Oklahoma, 4; Montana, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 13, 1940, 34 cases as follows: North Carolina, 3; South Carolina, 5; Georgia, 9; Florida, 2; Alabama, 4; Mississippi, 1; Louisiana, 4; Texas, 6.
[5] Colorado tick fever, week ended July 13, 1940, Colorado, 2 cases.

PLAGUE INFECTION IN LICE FROM A MARMOT IN PARK COUNTY, WYO.

Under date of July 5, 1940, Surgeon L. B. Byington reported plague infection proved in a pool of 14 lice from 1 marmot (*Marmota flaviventris*) shot 12 miles northwest of Cody, Park County, Wyo., on June 17. This is stated to be the first proof of plague infection in that county.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 29, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	114	31	15	2,433	337	787	9	366	47	1,243	-------
Current week [1]	49	32	13	2,519	232	616	1	364	34	935	-------
Maine:											
Portland	0	------	0	10	4	0	0	1	0	3	33
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	7
Manchester	0	------	0	0	0	2	0	0	0	0	9
Nashua	0	------	0	0	0	0	0	0	0	0	4
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	12
Rutland	0	------	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	0	------	0	165	6	28	0	11	2	60	189
Fall River	0	------	0	89	1	0	0	1	0	9	21
Springfield	0	------	0	3	2	1	0	1	0	0	40
Worcester	0	------	0	234	4	1	0	3	0	2	49
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	19
Providence	0	------	0	66	0	1	0	0	0	6	50
Connecticut:											
Bridgeport	0	------	0	6	1	1	0	1	0	0	31
Hartford	0	------	0	0	5	7	0	1	0	2	43
New Haven	0	------	0	3	2	6	0	0	0	14	38
New York:											
Buffalo	0	------	0	0	4	15	0	8	0	2	101
New York	16	5	2	368	32	131	0	71	5	102	1,268
Rochester	0	------	0	4	4	2	0	2	0	6	71
Syracuse	0	------	0	0	0	1	0	1	0	4	31
New Jersey:											
Camden	1	------	0	6	5	8	0	0	1	0	23
Newark	0	6	0	248	3	11	0	7	0	6	74
Trenton	0	------	0	0	3	2	0	4	0	0	40
Pennsylvania:											
Philadelphia	2	------	0	173	10	51	0	28	5	36	357
Pittsburgh	8	------	0	1	6	5	0	6	1	33	146
Reading	0	------	0	1	2	0	0	2	0	15	27
Scranton	1	------	------	0	------	1	0	------	0	0	------
Ohio:											
Cincinnati	0	------	0	1	4	4	0	4	0	16	132
Cleveland	1	8	2	4	4	11	0	10	0	48	163
Columbus	0	------	0	0	1	4	0	4	0	8	58
Toledo	1	------	0	1	2	10	0	4	0	18	61
Indiana:											
Anderson	0	------	0	0	2	0	0	0	0	2	6
Fort Wayne	0	------	0	4	1	0	0	1	0	4	17
Indianapolis	0	------	3	2	4	2	0	2	0	4	109
Muncie	0	------	0	0	1	0	0	0	0	0	18
South Bend	0	------	1	0	3	0	0	0	0	0	19
Terre Haute	0	------	0	0	0	0	0	2	0	0	19
Illinois:											
Alton	0	------	0	0	1	0	0	1	0	0	8
Chicago	8	------	0	152	15	171	0	41	1	44	630
Elgin	0	------	0	0	0	0	0	0	0	4	12
Moline	0	------	0	1	0	0	0	0	0	1	8
Springfield	0	------	0	0	3	0	0	1	0	3	19
Michigan:											
Detroit	0	------	0	296	6	29	0	11	1	65	234
Flint	0	------	0	1	0	3	0	2	0	0	20
Grand Rapids	0	------	0	16	1	7	0	2	0	14	81
Wisconsin:											
Kenosha	0	------	0	29	0	2	0	0	0	1	6
Madison	0	------	0	40	0	0	0	1	0	1	11
Milwaukee	0	------	0	335	0	19	0	3	0	9	83
Racine	0	------	0	15	0	0	0	0	0	2	13
Superior	0	------	0	26	0	1	0	0	0	0	6

[1] Figures for Barre and Minneapolis estimated; reports not received.

City reports for week ended June 29, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	-	0	9	1	1	0	0	0	1	15
Minneapolis	-	-	-	-	-	-	-	-	-	-	-
St. Paul	0	-	0	1	2	8	0	1	0	4	57
Iowa:											
Cedar Rapids	0	-	-	2	-	1	0	-	0	3	-
Davenport	0	-	-	0	-	0	0	-	0	0	-
Des Moines	0	-	0	3	0	4	2	0	0	0	20
Sioux City	0	-	-	0	-	3	0	-	0	1	-
Waterloo	1	-	-	2	-	0	0	-	0	3	-
Missouri:											
Kansas City	0	-	1	3	4	5	0	3	0	3	88
St. Joseph	0	-	0	0	0	1	0	0	0	0	14
St. Louis	0	-	0	4	6	4	0	10	1	10	183
North Dakota:											
Fargo	0	-	0	0	0	1	0	0	0	0	13
Grand Forks	0	-	-	0	-	1	0	-	0	5	-
Minot	0	-	0	0	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	0	-	-	0	-	0	0	-	0	7	-
Nebraska:											
Lincoln	0	-	-	0	-	1	0	-	0	1	-
Omaha	1	-	0	2	0	0	0	3	1	1	50
Kansas:											
Lawrence	0	1	0	0	0	0	0	0	0	3	3
Topeka	0	-	0	11	2	2	0	0	0	0	21
Wichita	0	1	0	0	1	0	0	1	1	2	30
Delaware:											
Wilmington	0	-	0	1	0	2	0	0	1	3	20
Maryland:											
Baltimore	0	1	1	4	8	3	0	10	0	122	192
Cumberland	0	-	0	0	0	0	0	0	0	0	11
Frederick	0	-	0	0	0	0	0	0	0	0	6
Dist. of Col.:											
Washington	0	-	0	1	3	11	0	12	0	1	152
Virginia:											
Lynchburg	1	-	0	2	1	0	0	1	0	5	17
Norfolk	0	-	0	9	1	0	0	1	0	0	15
Richmond	0	-	0	0	1	0	0	0	0	1	38
Roanoke	0	-	0	17	0	0	0	0	0	3	10
West Virginia:											
Charleston	0	-	0	0	2	3	0	1	0	1	15
Huntington	0	-	-	0	-	0	0	-	0	0	-
Wheeling	0	-	0	0	2	0	0	0	0	1	24
North Carolina:											
Gastonia	0	-	-	0	0	-	0	0	-	1	-
Raleigh	0	-	0	0	1	0	0	0	0	3	22
Wilmington	0	-	0	0	2	0	0	0	0	0	12
Winston-Salem	0	-	0	0	0	1	0	2	0	4	21
South Carolina:											
Charleston	0	-	0	0	1	1	0	1	0	0	21
Florence	0	-	0	0	0	0	0	0	0	0	19
Greenville	1	-	0	0	0	0	0	0	1	1	4
Georgia:											
Atlanta	0	3	0	1	7	1	0	5	0	18	72
Brunswick	0	-	0	0	0	0	0	0	0	0	2
Savannah	0	-	0	0	0	0	0	3	1	1	25
Florida:											
Miami	0	-	0	1	3	1	0	4	1	0	40
Tampa	0	-	0	9	1	0	0	1	0	0	20
Kentucky:											
Ashland	0	-	0	0	1	0	0	0	0	1	10
Covington	0	-	0	5	1	0	0	4	0	5	18
Lexington	0	-	0	40	0	0	0	1	0	3	15
Louisville	0	-	0	6	2	5	0	1	0	32	62
Tennessee:											
Knoxville	0	-	0	5	0	1	0	0	0	0	27
Memphis	0	-	0	4	2	0	1	4	1	9	80
Nashville	0	-	0	3	3	2	0	3	1	8	57
Alabama:											
Birmingham	0	-	1	5	4	2	0	4	1	2	58
Mobile	0	-	0	0	0	2	0	1	0	0	18
Montgomery	1	-	-	0	-	0	0	-	0	0	-
Arkansas:											
Fort Smith	0	-	-	0	-	0	0	-	0	2	-
Little Rock	0	-	0	0	2	0	0	1	1	0	5

City reports for week ended June 29, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
New Orleans	0	------	0	3	6	1	0	12	3	32	140
Shreveport	0	------	0	0	0	0	0	1	3	0	42
Oklahoma:											
Oklahoma City	0	------	0	1	1	1	0	3	0	0	33
Tulsa	0	------	0	2	5	0	0	1	1	9	20
Texas:											
Dallas	2	------	0	34	2	0	0	3	2	7	78
Fort Worth	0	------	0	0	2	1	0	1	0	0	37
Galveston	0	------	0	0	0	0	0	2	0	0	25
Houston	0	1	0	14	4	2	0	7	1	1	110
San Antonio	0	------	0	0	3	0	0	5	0	8	63
Montana:											
Billings	0	------	0	0	0	0	0	1	0	0	7
Great Falls	0	------	0	18	3	0	0	0	0	0	7
Helena	0	------	0	0	0	0	0	0	0	0	4
Missoula	0	------	0	1	1	0	0	0	0	0	9
Idaho:											
Boise	0	------	0	0	0	0	0	1	0	0	5
Colorado:											
Colorado Springs	0	------	0	1	1	2	0	1	0	0	9
Denver	8	------	0	12	5	2	0	4	0	0	92
Pueblo	0	------	0	4	1	0	0	0	0	3	8
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	2	0	2	12
Utah:											
Salt Lake City	0	------	0	52	2	3	0	0	0	54	38
Washington:											
Seattle	0	------	0	33	3	3	0	3	0	8	78
Spokane	0	------	0	1	0	0	0	0	0	0	25
Tacoma	0	------	0	1	0	1	0	1	0	0	33
Oregon:											
Portland	2	------	0	7	3	3	0	0	0	10	76
Salem	0	------	--------	0	--------	0	0	--------	0	0	--------
California:											
Los Angeles	3	6	0	6	1	12	0	23	0	77	328
Sacramento	0	------	0	1	1	4	0	1	0	1	30
San Francisco	3	1	2	3	3	4	0	5	0	16	161

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Rhode Island:				**District of Columbia:**			
Providence	1	0	0	Washington	1	1	1
New York:				**Virginia:**			
Buffalo	3	1	0	Richmond	0	0	1
New York	2	0	0	**Oklahoma:**			
Illinois:				Oklahoma City	0	0	1
Chicago	0	0	1	**Washington:**			
Wisconsin:				Tacoma	0	0	10
Milwaukee	1	0	0	**California:**			
Missouri:				Los Angeles	0	0	5
St. Joseph	0	1	0	San Francisco	0	0	1
Nebraska:							
Omaha	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: New York, 1; St. Louis, 1; Omaha, 1; Missoula, 1.
Pellagra.—Cases: Birmingham, 1.
Typhus fever.—Cases: Charleston, S. C., 1; Miami, 1; New Orleans, 2. Deaths: New York, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 8, 1940.—During the week ended June 8, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	5					6
Chickenpox		20	1	197	439	35	9	2	79	782
Diphtheria				34	1	1				36
Dysentery				1						1
Influenza		8			51				18	77
Measles			5	116	289	158	146	2	94	810
Mumps				45	272	7	40		29	393
Pneumonia		3			17	2			5	27
Poliomyelitis					1	1				2
Scarlet fever		2	1	80	100	15	13	12		223
Trachoma									2	2
Tuberculosis	3	2	9	38	41	31	15	4		143
Typhoid and paratyphoid fever			1	13	2	1	5	1	1	24
Whooping cough		48	3	125	112	20	36	4	25	382

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of June 28, 1940, pages 1188–1191. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

China—South Hsingan Province—Tungliao (vicinity of).—A report dated July 7, 1940, stated that up to July 6, 1940, 17 cases of plague had occurred in the vicinity of Tungliao, South Hsingan Province, China.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauilo (vicinity of).—A rat found on June 7, 1940, another on June 18, and another on June 20, 1940, in the vicinity of Paauilo, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

United States—Wyoming—Park County.—A report of plague infection in Park County, Wyoming, appears on page 1319 of this issue of PUBLIC HEALTH REPORTS.

Typhus Fever

Straits Settlements—Singapore.—During the week ended May 4, 1940, 1 case of typhus fever was reported in Singapore, Straits Settlements.

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Public Health Reports

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IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE 1798

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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PROTECTIVE OINTMENT FOR THE PREVENTION OF POISON IVY DERMATITIS[1]

By LOUIS SCHWARTZ, *Medical Director*, LEON H. WARREN, *Acting Assistant Surgeon*, and FREDERICK H. GOLDMAN, *Associate Chemist, United States Public Health Service*

Plants are one of the most frequent causes of contact dermatitis. In a compilation of 9,116 cases of occupational dermatitis reported to various State compensation boards, 10.7 percent were caused by plants. Rhus poisoning constitutes by far the largest percentage of these plant dermatoses. Field workers, such as farmers, horticulturists, gardeners, Civilian Conservation Corps workers, and men engaged in clearing land are the ones most often affected.

Many queries are received by the Public Health Service as to what means of protection should be used to prevent the occurrence of this form of dermatitis among field workers. While there are many efficient methods for the treatment of rhus poisoning, methods for its prevention are few. Desensitizing injections of ascending doses of rhus toxin have proven beneficial in some cases. These inoculations are more or less impracticable in field workers because they must be instituted some time before work in the field is begun, and because the labor turn-over would make it necessary to be continually desensitizing new men and render valueless, as far as the work is concerned, the injections given to the men who leave. Besides, careful medical supervision is necessary since the injections are sometimes attended with untoward reactions.

Various methods of prevention have been recommended: (1) Bathing the exposed parts with a strong solution of potassium permanganate; the objection to this method is that the stain is difficult to remove. (2) Applying to the exposed parts a 3–5 percent solution of ferric chloride in equal parts of glycerin and water; the objection to this is that persistent pigmentation of the skin may result from this procedure.

[1] From the Office of Dermatoses Investigations, National Institute of Health. Paper delivered at the Third Annual Conference of Governmental Hygienists at the National Institute of Health, Bethesda, Md., May 1, 1940.

The active principle of rhus is urushiol, a mixture of o-dihydroxybenzenes with a normal 15 carbon atom side chain in position 3.

It occurred to one of us that if there could be found a chemical which would rapidly decompose or split up this complex radical, its irritating properties might be destroyed. Such a chemical, in order to be of use in the prevention of dermatitis, must itself be nonirritant. It has been known that potassium permanganate (a powerful oxidizing agent) will render urushiol harmless, but, as stated before, potassium permanganate discolors the skin. There are, however, a number of powerful, nonirritant, nonstaining oxidizing agents, such as sodium perborate, potassium chlorate, potassium periodate, and zinc peroxide.

We decided to test the detoxicant action of these oxidizing agents upon urushiol. For this purpose an extract of poison ivy, prepared in the following manner, was obtained from Lederle Laboratories.

Six pounds of poison ivy leaf were extracted with 12 quarts of acetone and between 11 and 12 liters of extract were obtained. Included in this extract was water from the green leaves. Not more than 5 percent of extract was lost in the process. Any loss of activity of the extracted irritant was avoided by never allowing the extract to dry through complete evaporation of the acetone. A small quantity of inert substance remaining in the acetone extract was insoluble in vegetable oils and was removed by warm filtration through a Berkfeld filter. This fraction was also insoluble in mineral oil. The original 3,000 gm. of leaf in 12,000 cc. represented a 1:4 dilution. This was evaporated down to 100 cc. (120 times as concentrated). Therefore, the extract was 30 times as concentrated as the leaf. One hundred cc. of extract contained 13.5 gm. of resin, and 1 drop contained 0.08 gm. of resin.

One drop of a mixture consisting of equal parts of a saturated aqueous solution of potassium chlorate and the acetone extract of the poison ivy resin was applied to the shorn abdomen of a guinea pig. Seventy-two hours later, circumscribed erythematous patches corresponding to the original spread of the resin mixture were observed on the abdomen of the guinea pig. Seventy-two hours later the adherent crust was removed and tested for solubility in acetone. Since it was insoluble in the latter, it is believed to have been desquamated skin rather than a film of the resin.

One drop of a mixture consisting of equal parts of a saturated aqueous solution of sodium perborate and the acetone extract of the poison ivy resin was applied to the shorn abdomen of another guinea pig, with reactions similar to the above. Results of this experiment seemed to indicate no perceptible difference in degree of detoxicant action of these two chemicals upon urushiol contained in the resin. The apparent failure of these oxidizing agents to exert a detoxicant action upon urushiol may have been due to the fact that there was

not sufficient oxygen liberated from either of the two solutions to oxidize completely the amount of resin in the mixture tested. It is also possible that the 50-percent acetone solution caused the dermatitis. As the risk from dermatitis was not too hazardous, it was decided to experiment upon human beings.

A portion of the extract of the resin of poison ivy in acetone (containing 13 percent of the resin by weight) was mixed with equal parts of water (by volume). One drop of this mixture was placed on the flexor surface of the arm of one of the authors and allowed to evaporate, leaving a brown stain of resin on the skin. Forty hours later an erythematous macule ¼ inch in diameter appeared at the site of application.

A second portion of the ivy extract was mixed with equal parts of a saturated aqueous solution of sodium perborate. One drop of this mixture was placed on the flexor surface of the upper part of the forearm of one of us and allowed to evaporate, leaving a brown stain of resin on the skin. At the end of 72 hours there was no skin reaction at this site.

A third portion of the ivy extract was mixed with a saturated aqueous solution of potassium chlorate. One drop of this mixture was placed on the flexor surface of the lower part of the forearm of one of us and allowed to evaporate, leaving a brown stain of the resin on the skin. At the end of 48 hours there appeared an erythematous macule ⅛ inch in diameter at the above site. The first and second tests above were repeated on the flexor surface of the arms of 8 volunteers, using 1 drop of the mixture of ivy extract and equal parts of saturated aqueous solution of sodium perborate, with a control test of 1 drop of the mixture of ivy extract and equal parts of water.

One of us was not susceptible to poison ivy, and failed to react to either the detoxified or control tests. Two of us developed a spreading erythema around the site of the control test within 24 hours, but no reaction to the detoxified resin. However, 8 and 9 days later, respectively, the two latter subjects developed an exacerbation of dermatitis at the site of the control test, together with a delayed reaction at the site of the previously negative tests to the detoxified resin. The reactions covered a considerable portion of the arms and became vesicular. They were flare-ups due to sensitization by application of the original unneutralized resin, together with the activation of a previously negative skin test site. Another subject was only slightly susceptible to the unneutralized resin and not at all to the neutralized resin. The remaining 5 subjects developed skin reactions of varying severity to the unneutralized resin and in each case markedly less reaction to the neutralized resin. One case developed a severe dermatitis with marked edema of the entire arm and forearm (fig. 1).

This experiment showed that the solution of sodium perborate had

some destructive action on the toxicity of urushiol, but that it did not completely detoxify it. This was thought to be due to the small amount of sodium perborate in the saturated solution. Since equal parts by volume of a saturated solution of sodium perborate did not liberate sufficient oxygen to neutralize completely the poison in the extract, we thought that if we incorporated the solid perborate in a vanishing cream and rubbed the vanishing cream on the skin, then the moisture from the skin would continue to liberate sufficient oxygen from the powdered sodium perborate to neutralize the action of whatever urushiol might come in contact with the skin. Moreover, the vanishing cream when rubbed into the skin would fill the pores and form a protective covering and prevent much of the poison from penetrating the skin. When the vanishing cream containing sodium perborate is rubbed into the skin, some of the sodium perborate remains on the surface of the skin and may oxidize whatever poison ivy comes in contact with it. Moreover, as the perspiration comes in contact with the vanishing cream in the pores of the skin, a soap is formed and the alkalinity of the soap liberates oxygen from the perborate while the soapy solution washes the poison ivy out of the skin from within outwards.

The protective action of such a vanishing cream containing 10 percent sodium perborate was tested on 9 volunteers. The protective cream was rubbed into the skin and on it was placed 1 drop of a solution of Lederle extract diluted with from equal parts to 1–10 parts of olive oil. This strength is from 3 to 15 times the concentration of the toxin contained in the fresh leaf.

The details of this experiment are as follows: A vanishing cream consisting of stearic acid (triple pressed) 200 gm., potassium hydroxide (sticks) 14 gm., water 800 cc., alcohol (90 percent) 40 cc., was compounded. To 50 gm. of the above cream, 5 gm. of sodium perborate were added. The resultant protective oxidizing cream was granular and did not rub well into the skin. A white deposit, probably of sodium perborate, was left on the surface of the skin.

A vial containing a mixture of equal parts of the acetone extract of the ivy resin and water was stoppered, shaken well, and the tip of the stopper touched to an area of skin of the forearm which had been previously coated with a film of the protective cream. It was noted that the acetone in the mixture dissolved the film of cream on the skin at the point of contact with the stopper. The application was allowed to dry. Two hours later the site was washed thoroughly with soap and water. Seventy-two hours later a vesicular skin reaction ½ inch in diameter developed at the site of application of the ivy resin. This corresponded to the area over which the resin was applied and where the cream had been dissolved by the acetone. There was

FIGURE 1 —Three subjects tested with extract of poison ivy mixed with equal parts of a solution of sodium perborate The left hand subject shows no reaction The middle subject shows severe reaction on the right arm and less severe on the left arm The subject at the right shows a spreading reaction on the upper arm

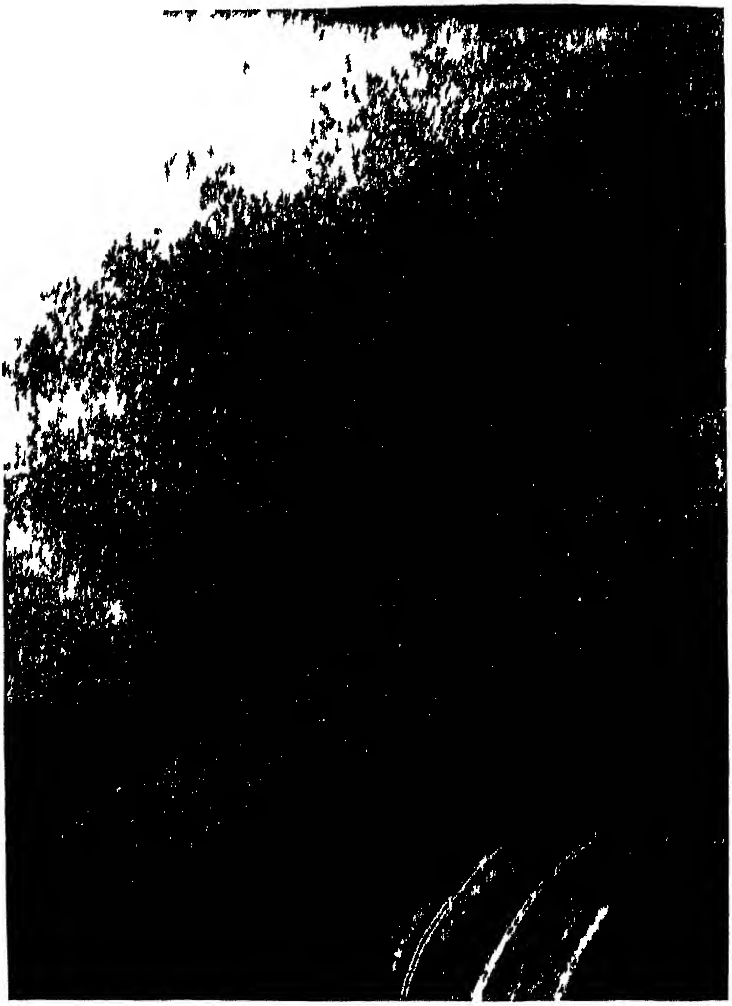

FIGURE 2 —Reaction at site of application of poison ivy extract applied over 10 percent sodium perborate in vanishing cream on a person highly susceptible to poison ivy

no spread of the erythema beyond this area as there had been when no cream was applied.

In order to eliminate the solvent effect of the acetone on the cream, it was decided to dissolve the resin in mineral oil. Three drops of the acetone solution of the toxin were allowed to evaporate to dryness on a watch crystal and the remaining resin was dissolved in three drops of mineral oil. One drop of the solution was applied to the skin previously smeared with the cream. An erythema about ¼ inch in diameter developed at the end of 72 hours localized to the site of the application of the solution (fig. 2).

A vanishing cream containing 10 percent sodium perborate was then tested for its protective action against ivy resin on the original 9 volunteers. Three drops of acetone extract of the resin were allowed to evaporate and the resin dissolved in 6 drops of olive oil. (This corresponds to 15 times the concentration of the toxin in the fresh leaf.) One drop of this solution was applied to an area of skin protected by the oxidant vanishing cream on 2 subjects and allowed to remain for 5 minutes, the excess removed by blotting, and the cream removed by washing with soap and water at the end of 4 hours. An erythema limited to site of the application of the drop of the solution developed at the end of 24 and 48 hours, respectively.

In three cases the resin was applied in the form of one drop of a mixture of equal parts of the acetone extract and water. This was washed off after 4 hours with soap and water. Only one of these developed a vesicular reaction limited to the site of the application of the drop of the solution.

In the remaining 4 cases, 3 drops of acetone extract of the resin were allowed to evaporate, the resin dissolved in 30 drops of olive oil, and 1 drop of this solution (three times the concentration of the irritant that is in the fresh leaf) allowed to remain for 2 minutes on the area protected by the oxidant vanishing cream. It was removed at the end of 4 hours by washing with soap and water. Only one of these developed any reaction and he had only an erythema about one-fourth inch in diameter. He was the subject who developed an edema and vesiculation of the entire arm when the ivy extract was applied to the unprotected skin.

On one of us the application of one drop of the solution of resin in one drop of olive oil was repeated at the end of 1 hour and again at the end of 2 hours to the area of skin originally protected by application of the oxidant vanishing cream, without renewal of the cream. When 4 hours had elapsed after the first of these three applications, the arm was washed with soap and water. No reactions resulted from this experiment.

In none of the subjects was there any spread of the skin reaction beyond the actual site of the application of the poison.

Since six out of nine subjects developed no reaction when the toxin was applied over the protective cream, and since the person who reacted most severely to the application of the Lederle extract without the protective ointment developed only a slight erythema about one-fourth inch in diameter at the site of application of the toxin when the protective ointment was used, it is concluded that the vanishing cream containing perborate gives considerable protection against poison ivy dermatitis.

In order to decide whether both the alkali and the oxidizing agents are of value in this ointment, a portion of the Lederle extract was treated with 20 percent sodium hydrate and when all signs of reaction were over it was neutralized with acetic acid so that the alkali would not burn the skin. A drop of the solution was then applied to the skin and at the end of 3 days an area of erythema and vesicles about 1 inch long and one-half inch wide developed. This showed that urushiol cannot be inactivated by alkali alone.

Another portion of the Lederle extract was treated with a saturated solution of potassium periodate (about 2 percent) and applied as a skin test. There was no reaction to this, showing that oxidation inactivates urushiol. The crystals of potassium periodate were moistened and applied as a skin test. No reactions developed at this site, showing that potassium periodate itself is not a skin irritant. We know from previous skin tests that sodium perborate and zinc peroxide are not skin irritants. This experiment showed that it was the oxidant and not the alkali in the vanishing cream which inactivated the irritant principle of poison ivy.

In order to test the value of the protective cream against growing poison ivy, the hands and the right forearm of two of the susceptible subjects (one of whom was the most susceptible of all tested), were smeared with the protective ointment. Both subjects then plucked poison ivy leaves as they were found growing around a tree (figs. 3 and 4). In addition to this, the leaves were handled and pressed against the cream-protected areas of the forearms of both subjects, brushed up and down (with the other protected hand) and allowed to remain one-half hour on one subject, and several minutes on the other (figs. 5 and 6). One hour later the protective cream was washed off with water and no reactions followed.

That the more susceptible of the two subjects was still sensitive to poison ivy was shown by the fact that at the time the above experiment was performed he had a linear vesicular eruption on one of his arms from accidental contact with poison ivy. In order to verify the fact that the poison ivy leaves used in this experiment contained the active toxin and that the less susceptible subject was still sensitive, the following experiment was performed:

This subject applied some of the poison ivy leaves from the same

FIGURE 3 —Picking poison ivy after applying protective cream

FIGURE 4 - Picking poison ivy after applying protective cream.

FIGURE 5.—Applying freshly picked poison ivy to the forearm of a susceptible subject covered with protective cream

FIGURE 6.—Applying freshly picked poison ivy to forearm of susceptible subject covered with protective cream.

plant shown in figures 3 and 4 to an unprotected portion of his left forearm. Thirty-six hours later there was considerable pruritus. At the end of 48 hours there was an area of erythema about 1½ inches long and 1 inch wide covered with minute vesicles at the site of the application of the fresh poison ivy leaf. This experiment proved that the ivy leaves contained the toxin and that the less susceptible of the two subjects still retained his sensitivity.

CONCLUSIONS

1. An alkaline vanishing cream containing a nonirritant oxidizing agent, such as sodium perborate or potassium periodate is an effective preventive against poison ivy dermatitis.
2. It should be well rubbed into the skin of the arms and face of workers before exposure to poison ivy. This procedure leaves a deposit of the powdered oxidant on the skin.
3. The protective cream should be allowed to remain on until the noon hour when it should be removed by washing with soap and water; this will emulsify the vanishing cream in the pores of the skin and wash away from within outward whatever toxin may be in the pores or on the skin.
4. The cream should be reapplied again after the lunch hour and again washed off in the evening when work is over.
5. This vanishing cream should be freshly prepared at least once in 2 weeks to avoid deterioration. However, the cream used in our experiments was slightly discolored but still active after 1 month.

ACKNOWLEDGMENTS

We wish to acknowledge gratefully the cooperation of Drs. Sayers, Neal, Castberg, Dreessen, Mr. Reinhart, and Mr. Schayer, who at no small inconvenience and discomfort submitted themselves for the patch tests which are the bases of this study.

EFFECT OF SYNTHETIC PANTOTHENIC ACID ON ADRENAL HEMORRHAGE, ATROPHY, AND NECROSIS IN RATS

By Floyd S. Daft, *Biochemist*, W. H. Sebrell, *Surgeon, National Institute of Health, United States Public Health Service*, S. H. Babcock, Jr., and T. H. Jukes, *University of California*

In a previous article Daft and Sebrell (*1*) reported hemorrhagic necrosis of the adrenal glands of rats on deficient diets, apparently due to some unidentified dietary factor. It was noted, further, that when rats received an adequate amount of pyridoxine (B_6) without "filtrate factor" the incidence of adrenal necrosis was very high; while the animals given a crude fuller's earth filtrate from liver or

rice polishings did not have adrenal necrosis. Our observations have been extended and it has been found that adrenal hemorrhage or necrosis occurs in almost 100 percent of our rats on a vitamin B complex deficient diet when they receive a supplement containing crystalline pyridoxine but no "filtrate factor," and the experiment is allowed to proceed to death of the animals. As fractionation of the active "filtrate factor" concentrates progressed, it became evident also that the factor preventing adrenal necrosis followed pantothenic acid; but until synthetic pantothenic acid could be obtained, we could not be certain that this active factor was not an accompanying impurity. We wish to report at this time that rats given synthetic pantothenic acid show arrest and repair of the degenerative process in the adrenal glands.

EXPERIMENT

Pantothenic acid was prepared from alpha-hydroxy-beta-beta-dimethyl-gamma-butyro-lactone and beta-alanine by coupling directly with the aid of sodium hydroxide according to the method described by Babcock and Jukes (*2*). The solution thus prepared was standardized by means of chick assay (*3*). In this method one chick unit has been shown to correspond to 14 micrograms of natural pantothenic acid (*4*) or to 28 micrograms of synthetic *dl*-pantothenic acid (*2*).

Forty-eight albino rats at weaning were placed on our diet No. 461, which consists of leached and alcohol extracted casein, 18 percent, cod liver oil, 2 percent, Wesson oil, 3 percent, Osborne and Mendel salt mixture, 4 percent, and sucrose, 73 percent. After a depletion period of 10 days to 2 weeks, when the weights of the animals were stationary or declining, each was given a daily supplement of 20 micrograms of riboflavin, 15 micrograms of thiamin chloride, 10 micrograms of pyridoxine hydrochloride, 2 milligrams of choline, and 1 milligram of nicotinic acid. There was an immediate and rapid gain in weight which was sustained, however, for only 2 or 3 weeks. After 6 to 10 weeks on the deficient diet, 26 of the animals showed evidence of nosebleed, 7 had a sticky exudate on the eyelids which at times closed the eyes entirely, 3 had depilation about the nose and mouth, and 1 had "spectacled eyes." The rats were then divided into groups: 31 were treated with synthetic pantothenic acid, while 17 litter mates were not so treated. In order to make this curative test as severe as possible the rats appearing to be in the worst condition (from clinical symptoms and weight curves) were treated; the animals which seemed in best condition were used as the untreated controls. Six rats were sacrificed after receiving 6 daily doses of 100 micrograms of synthetic pantothenic acid; 7 rats, after 10 daily doses; and 17, after 14 daily doses. One additional

rat was sacrificed after receiving 14 daily doses, each of 200 micrograms. All of the untreated control animals were sacrificed at the same time that their litter mates completed the 14 days of synthetic pantothenic acid treatment.

The symptoms of nosebleed, ocular exudate, "spectacled eyes," and depilation not only continued to increase in severity in the untreated animals, but also developed in additional rats in this group. These symptoms in the rats treated with synthetic pantothenic acid either disappeared entirely or decreased in severity; and no symptoms developed while the animals were being treated

The influence of synthetic pantothenic acid on the histopathology of the adrenals is striking.[1] Congestion, fibrosis, scarring, and hemosiderin deposition were found singly or in combination in the adrenals of all the 44 animals examined.[2] Necrosis, atrophy, and hemorrhage, however, were found in only 1 adrenal of 1 rat[3] of the 28 treated animals. Ten of the 16 untreated rats showed one or more of these adrenal lesions. Three showed adrenal hemorrhage, atrophy, and necrosis, 2 showed hemorrhage and necrosis, 2 hemorrhage and atrophy, 2 atrophy, and 1 hemorrhage. Fourteen showed marked fat depletion of the adrenals while none of the treated animals gave a similar finding. If the hormones of the adrenal cortex are intimately associated with the fat, as many investigators believe, then the increased fat in the glands of the treated animals probably indicates a return toward normal function.

DISCUSSION

Necrosis and hemorrhage of the adrenal glands of rats on deficient diets have been noted in several laboratories and have been reported from at least two. György, Goldblatt, Miller, and Fulton (*5*) mentioned this condition in connection with a failure of hematopoiesis. Daft and Sebrell (*1*) reported that adrenal necrosis occurred on "filtrate factor" deficient diets without the bone-marrow and blood-cell changes noted by György et al.[4] In an accompanying paper, Nelson (*6*) described the histopathology of the adrenal gland.

Morgan and Simms (*7*) have reported that in rats deprived of the anti-grey-hair vitamin, the zona reticularis of the adrenal glands degenerated and that there were heavy deposits of yellow pigment and connective tissue and excess vascularity. In an earlier note (*8*), they

[1] All of the histological examinations were made by Passed Assistant Surgeon L L Ashburn and our remarks are based on his findings The details, together with a description of accompanying histopathology of other organs, are reported in "The Effect of Administration of Pantothenic Acid on the Histopathology of the Filtrate Factor Deficiency State in Rats," the following article in this issue of the Public Health Reports

[2] The adrenals from 4 rats—1 in the untreated group, 2 treated for 6 days, and 1 treated for 14 days—were lost and therefore not examined.

[3] From gross examination and the histological findings in the other adrenal (used for fat stain), it is probable that this one came by mistake from another animal

[4] A much larger number of rats than reported in the previous paper have now been studied with the same general results

spoke of atrophy as the change which they noted in the adrenal glands. In reference to hair depigmentation, they say (7), "The concurrent skin and gland changes seen in the rat may well be suspected as being products of the same mechanism."

Our experimental diet presumably contains little or no anti-grey-hair vitamin. There is definite evidence of repair of the adrenal lesions following treatment with synthetic pantothenic acid. There can be little doubt of the activity of pantothenic acid, as shown by these experiments; it is possible that other substances as well may be concerned in the production or repair of adrenal damage due to dietary insufficiencies.

The clinical symptoms in rats due to pantothenic acid deficiency have not been completely studied. The treatment with synthetic pantothenic acid was followed by definite improvement in the symptoms of nosebleed, sticky exudate on the eyelids, "spectacled eyes," and depilation about the nose and mouth.

SUMMARY

The adrenal glands of 44 rats were studied histologically. All of these animals received our basic diet and a supplement containing thiamin, flavin, pyridoxine, nicotinic acid, and choline. Sixteen of the rats received no pantothenic acid; 4 received 100 micrograms of synthetic pantothenic acid daily during the last 6 days of the experiment; 7 received 100 micrograms daily for the last 10 days; 16 received 100 micrograms daily for the last 14 days; and 1 received 200 micrograms daily for the last 14 days.

The rats were killed after 52 to 84 days on the deficient basic diet. Ten of the 16 untreated animals had hemorrhage, necrosis, or atrophy of the adrenal glands or a combination of these lesions; 14 showed marked fat depletion of the adrenals. Only 1 adrenal of 1 rat of 28 litter mates given synthetic pantothenic acid had hemorrhage, atrophy, or necrosis; only 4 of these animals showed even moderate fat depletion of the adrenals and this was in patchy areas.

CONCLUSION

Repair or prevention of adrenal hemorrhage, atrophy, and necrosis in rats is brought about by a daily dose of 100 micrograms of synthetic pantothenic acid for 6 to 14 days. This is presumptive evidence that a deficiency of pantothenic acid is at least one of the causes of these adrenal lesions in rats on deficient diets.

REFERENCES

(1) Daft, Floyd S., and Sebrell, W. H.: Hemorrhagic adrenal necrosis in rats on deficient diets. Pub. Health Rep., 54: 2247 (1939).

(2) Babcock, S. H., Jr., and Jukes, T. H.: The biological activity of synthetic pantothenic acid. J. Am. Chem. Soc., 62: 1628 (1940).

(3) Jukes, T. H.: Further observations on the assay, distribution, and properties of the filtrate factor J. Biol. Chem., **117:** 11 (1937).
(4) Jukes, T. H : The pantothenic acid requirement of the chick. J. Biol. Chem., **129:** 225 (1939).
(5) Gyorgy, Paul, Goldblatt, Harry, Miller, F R., and Fulton, R. P.: Panmyelophthisis with hemorrhagic manifestations in rats on a nutritional basis. J. Exp. Med , **66:** 579 (1937).
(6) Nelson, A. A.: Hemorrhagic cortical necrosis of adrenals in rats on deficient diets. Pub. Health Rep , **54:** 2250 (1939).
(7) Morgan, Agnes Fay, and Simms, Helen Davison: Greying of fur and other disturbances in several species due to a vitamin deficiency. J. Nutrition, **19:** 233 (1940).
(8) Morgan, Agnes Fay, and Simms, Helen Davison: Adrenal atrophy and senescence produced by a vitamin deficiency. Science, **89:** 565 (1939).

THE EFFECT OF ADMINISTRATION OF PANTOTHENIC ACID ON THE HISTOPATHOLOGY OF THE FILTRATE FACTOR DEFICIENCY STATE IN RATS [1]

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This report is based largely on the 48 animals described in the paper by Daft, Sebrell, Babcock, and Jukes (*1*), with some general remarks based on experience gathered from a large series of animals (unpublished data) which were allowed to die while being fed on a diet deficient in the "filtrate factor."

The purpose of this experiment was to determine the effect of pantothenic acid on the clinical symptoms and pathologic lesions of rats on this deficient diet. Details of the experimental procedure are given in the preceding paper (*1*). This report deals only with the pathologic aspects of the problem.

Tissues were fixed in Orth's fluid and stained by alum hematoxylin Romanowsky (*2*) and iron hematoxylin Van Gieson methods. One adrenal from each animal was impregnated with 1 percent osmic acid, one part, and potassium bichromate, two parts, immediately after fixation with Orth's fluid, and examined for its fat content.

Nelson (*3*), from this laboratory, has described the character of the adrenal and associated lesions in rats dying on this deficient diet. The animals reported in his study had died, presumably of the deficiency; hence, advanced and extensive lesions were the common finding. The 16 control (untreated) animals of the present study were killed after being on the deficient diet for 56 to 84 days.

MICROSCOPIC FINDINGS

ADRENALS FROM UNTREATED ANIMALS

Congestion, hemorrhage, atrophy, necrosis, scarring, fibrosis, hemosiderin deposition, and cortical fat depletion occurred as independent or combined lesions in all of the 16 controls.

[1] From the Division of Pathology, National Institute of Health.

Congestion.—Congestion was usually slight to moderate in degree and most often involved only the inner third of the cortex. In some glands, congestion was diffuse and marked or occurred as small foci scattered in the fascicular zone. It was slight in 1 animal, moderate in 7, and marked in 2.

Hemorrhage.—Hemorrhagic foci were usually small and most often located in the inner third of the cortex. They occurred with less frequency in the outer cortical layers, with or without concurrent involvement of the inner zone Hemorrhage was slight in 3 animals, moderate in 3, and marked in 2.

Atrophy.—Cell atrophy was a fairly common finding. Sometimes this was manifest only by a reduction in cell size, with slight widening of spaces between the cell rows, and occurred usually as small foci in the inner part of the fascicular zone. Diffuse involvement of the inner half to two-thirds of this zone was occasionally seen, with moderate to marked reduction in number and size of cortex cells. In such areas, stroma was not collapsed and a spongy appearance was produced. Atrophy was present occasionally in areas of hemorrhage, without necrosis; here, cells and cell rows were isolated from one another with reduction in cell size. Slight atrophy was seen in 4 cases; it was moderately extensive in 2 and marked in 1.

Necrosis.—The most common location for small areas of necrosis was the inner cortex at one or both ends of the oval medulla, and usually it involved only a small part of the adjacent fascicular zone. In such an area, cells were seen only as pale oxyphilic masses, nuclei being absent or karyorrhectic. Seen in a later stage, these lesions showed amorphous oxyphilic debris, a few macrophages and slight fibroblast proliferation and fibrosis. From this slight involvement all grades were seen up to subtotal cortical necrosis, with only a few small cells remaining in the glomerular zone. In contrast or in addition to this focal or diffuse necrosis, some animals showed a few isolated cells, scattered throughout the fascicular zone, which were slightly enlarged, had quite oxyphilic cytoplasm, and pyknotic or karyorrhectic nuclei. In the early and small lesions, capillaries were still recognizable and patent; in larger areas of necrosis they were reduced in number, having become necrotic or compressed and unrecognizable. Necrosis was slight in 2 animals, moderate in 2, and marked in 1. This latter animal also showed moderate calcium deposition, much of which was deposited as a surface incrustation on the necrotic cells. Calcification of necrotic debris was a fairly common finding in the animals allowed to die of the deficiency. However, in this group it was seen only once.

Scarring.—In agreement with the location of foci of necrosis, scars were most often found at the junction of the fascicular and reticular zones. They were usually small, dense, and narrow or linear, with

their long axes parallel to the capsule. In all of this group and in a larger series studied previously, linear scars, when present, always showed this orientation. Oval or irregularly rounded scars were less often present; these were usually located at one or both ends of the oval medulla and were much less dense than those described above. Two scars were found in each of 2 glands and 1 scar in each of 3.

Fibrosis.—Fibrosis was one of the most common findings, being present in 15 animals. It was very slight in 2, slight in 7, moderate in 5, and marked in 1. The fibrosis occurred regularly in the inner cortex and, when slight in degree, was present only in the juxtamedullary zone. It did not give the appearance of a scar, rather collagen fibers of varying thickness ramified between cells producing a fine fibrous feltwork. As this process progressed, the enclosed cells were reduced in number. The end stage was a fairly dense fibrous band in a juxtamedullary position. Besides the fibrosis of this inner zone, a very thin, occasionally incomplete fibrous capsule enclosed areas of calcification, and less frequently necrotic foci were similarly encapsulated.

Hemosiderin deposition.—The presence of hemosiderin pigmentation was determined by Perls' reaction for ferric iron. It was found in all of the 16 animals, being very slight in 2, slight in 6, moderate in in 5, and marked in 3. When it was present in very slight or slight amounts it was located only in the inner zone, often juxtamedullary or in scars. In 2 of the 5 animals showing a moderate amount, a little was also present in the fascicular zone. In one adrenal showing a large amount of hemosiderin, much of it was in the periadrenal fat, capsule, and fascicular zone, while the medulla contained a smaller amount. It was present in scars in larger amounts than in areas of necrosis. When it occurred in the latter location or associated with calcified foci, the hemosiderin was usually peripheral in position, having much the same physical relationship to these lesions as did hemorrhage. Most of the hemosiderin was phagocytosed, particularly that in the inner zone. When associated with hemorrhage or necrosis, it occurred both free and in macrophages.

Glomerular zone.—This zone in animals that died on the deficient diet was frequently absent, absent in stretches, or was quite thin. When it was absent the large cells of the fascicular zone abutted directly on the capsule. This condition was seen in only 1 animal of the present study. In 1, this zone was absent due to necrosis. It was thin in 4 and normal in 10.

Fascicular zone.—In general, the most striking cell alteration, other than necrosis, was decreased cytoplasmic vacuolation. This was seen in 14 animals, being moderate in 5 and marked in 9. In the 9 animals, cell cytoplasm was homogeneous and stained lightly basophilic to

amphophilic. Cells appeared normal in one animal and in one other there was marked diffuse atrophy.

Reticular zone.—This zone was distinct, with fairly sharp peripheral limitation, in 6 of the 16 animals. Cells were small, with relatively scanty cytoplasm. Their nuclei were essentially similar to those of the fascicular zone, though the proximity of nuclei to each other made this zone quite dark as compared to the middle layer. In 8 animals this inner zone was quite different. In these, cytoplasm was oxyphilic and slightly to moderately increased in amount; consequently nuclei showed wider separation and the two inner zones were no longer distinct. One additional animal showed an inner zone essentially similar to that just described, except that in variably sized foci the smaller type cells were present. In 1 animal there was no difference in cell type between the two inner zones.

Fat content.—One adrenal of each animal was studied after having been stained with osmic acid. It was realized that some fat might be lost in the process of dehydration and clearing. This was of no serious concern, however, since the purpose of this study was to allow comparison of distribution and amount of fat in the treated and untreated groups.

A number of adrenals from normal rats were studied to establish a basis for comparison. There was, of course, some variation in the fat content, but an average was taken as a standard, and on this basis the adrenals of the treated and untreated animals were rated as normal, or as showing varying grades of fat depletion. This method was not necessarily accurate for any given animal, but served quite satisfactorily for group comparison. Since alteration was present in varying degrees in different layers, they will be described separately.

The amount of fat in the glomerular zone was normal in 7 animals; reduction was slight in 3, moderate in 2, marked in 3, and subtotal in 1.

In the fascicular zone, the fat depletion was quite striking. This zone of 1 animal was normal. Reduction was slight in 1, marked in 5, and subtotal in 9.

The inner zone showed no fat in 9 animals and very small to small amounts in the remaining 7.

In the adrenals containing a normal amount of fat, it occurred as small black to dark gray droplets of fairly uniform size, occupying most of the cell cytoplasm. When fat depletion was moderate to marked, there was considerable variation in size, many being quite large, particularly in the inner zone where some appeared to be outside of cells. In the necrotic areas, fat was rarely seen; at most, only a few cells contained small to moderate amounts. Many of these cells were very probably phagocytes, but in the osmic acid preparation these were not readily distinguished from fat-containing cortex cells.

The fact that in many glands the glomerular zones contained normal or almost normal amounts of fat, when it was absent or largely depleted in the remainder of the cortex, is not explained, but may bear some relationship to the possibly different functions of the three layers.

Gross and microscopic observation showed that in animals that died on the deficient diet, there was marked loss of abdominal fat. When marked, there was a disappearance of fat cells; however, when only slight fat loss was present, microscopic study showed a decrease in size of cells and a reduction in number of droplets per cell, the cell cytoplasm not occupied by fat draplets being homogeneous and oxyphilic. Periadrenal fat was examined in 16 animals. It was normal in 3. Fat reduction was slight in 9, moderate in 2, and marked in 2.

ADRENALS FROM ANIMALS TREATED WITH PANTOTHENIC ACID

The general statements concerning the various types of adrenal lesions seen in the control animals apply equally to those of the treated groups and need not be reported. Here, only their type and number or extent will be given. There were 31 treated animals divided into groups of 6, 7, and 18, which were treated for 6, 10, and 14 days, respectively. From a pathological standpoint, there is not a sufficient difference between the groups to warrant separate description. In 3 animals the adrenal was lost or the preparation was unsatisfactory for study.

Congestion.—Congestion was present in 12 of the 28 animals; slight in 7 and moderate in 2, being limited to the inner zone in all except 1, in which it also occurred focally in the fascicular zone. This animal is the one referred to under the next heading.

Hemorrhage, atrophy, and necrosis.—These occurred in only 1 animal. This gland occasioned much surprise when examined microscopically. The amount of damage present should have been easily recognizable on gross examination. However, at autopsy the adrenal glands were recorded as normal. The osmic acid preparation showed normal fat content. These facts strongly indicate an unfortunate mislabeling of the adrenal gland while it was being prepared for microscopic examination.

Calcification.—Calcification was present in 4 animals, slight in 2, and moderate in 2.

Scarring.—Nine glands showed scarring, 1 scar in each of 3, 2 scars in 3, and 3 scars in 4 glands.

Fibrosis.—Fibrosis was very slight in 6 glands, slight in 12, and moderate in 8.

Hemosiderin.—Hemosiderin was present in 22 animals. The deposition was very slight in 1, slight in 7, moderate in 11, and marked in 5. In 7 of these, hemosiderin was present in all layers of cortex

and capsule. In only 2 of these were focal cortical lesions found (calcification). This is of particular interest owing to the fact that in previous observations large amounts of hemosiderin were found in the capsule and glomerular and fascicular zones only in cases which showed hemorrhagic or necrotic foci in outer cortex. This indicates that the damage to these glands had been much greater than that found following treatment.

Glomerular zone.—This zone was intact in all animals except one. In this rat a short stretch had an appearance similar to the fascicular zone.

Fascicular zone.—Cells of this layer were vacuolated and oxyphilic in all but one animal. This is the one referred to under the heading "necrosis" and showed cells with homogeneous, lightly basophilic cytoplasm essentially similar to those of the deficient animals.

Inner zone.—In 17 animals the cells of this layer were small; cytoplasm was scanty and less oxyphilic than the cells of fascicular zone. On low magnification this zone was dark owing to the concentration of nuclei. In 7 additional animals there was only a slight variation of this picture. In these animals, isolated or grouped large oxyphilic cells were seen in small numbers. In 3, there were none of the small cells present, cells being large and oxyphilic which made the separation of the fascicular and inner zones indistinct.

Fat content.—The glomerular zone was normal in 13 animals. Reduction of fat was slight in 10, moderate in 4, and marked in 1.

The fascicular zone was normal in 6 animals. Reduction of fat was slight in 19 and moderate in 3.

In the inner zone, fat was present in small amounts in 25 animals, in 4 of which most of it occurred as large globules. Three animals showed little or no fat in this layer.

Periadrenal fat was normal in 16, slightly reduced in 11, and in 1 animal it was not examined.

MICROSCOPIC CHANGES IN OTHER ORGANS

The only organs examined in this study, other than the adrenal gland, were the testis, spleen, pancreas, and tibia. Other organs have been examined in a previous study. In these, the absence of lesions or the occurrence of apparently unrelated conditions justified their exclusion from this study. The pituitary gland, thymus, and thyroid will be studied in future work on this subject.

Spleen.—The spleen was examined in all animals. In agreement with the findings reported by Nelson (*2*), there was no significant alteration in this organ other than the occurrence of hemosiderin. In the untreated animals, a small amount was present in 13 and a moderate amount in 4. In the treated group, it was absent or present in insignificant amounts in 12, present in very small amounts in 7, in

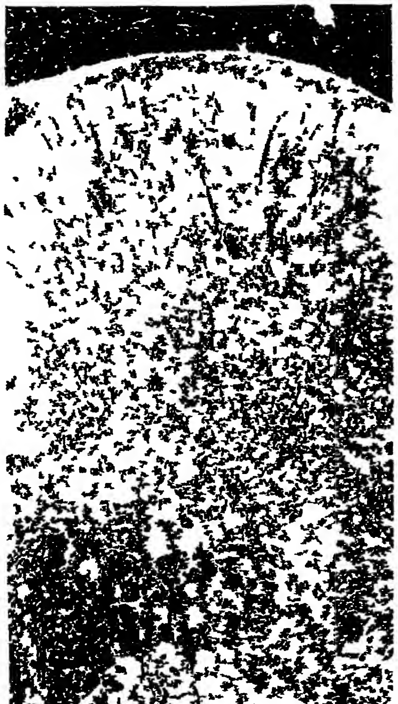

FIGURE 1.—Adrenal from untreated group. Subtotal fat depletion, a very little fat is present in subcapsular and in perimedullary cortex. Note the well blackened periadrenal fat (osmic acid stain × 70)

FIGURE 2.—Adrenal from untreated group. Fat content of glomerular zone is normal. A very few droplets are seen in perimedullary and outer fascicular zones (osmic acid stain × 160)

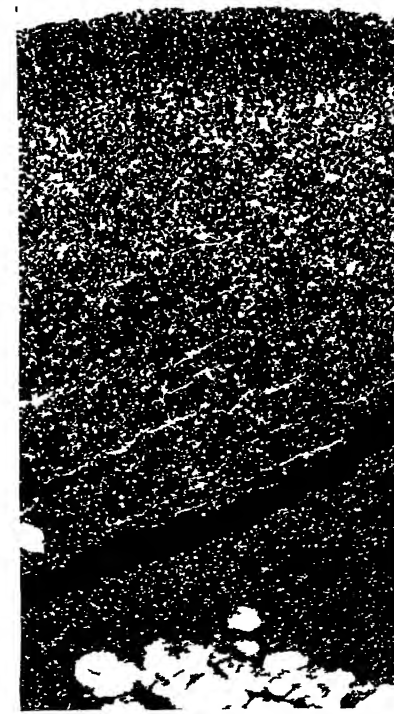

FIGURE 3.—Adrenal from treated group. Very slight diffuse fat depletion (osmic acid stain × 90)

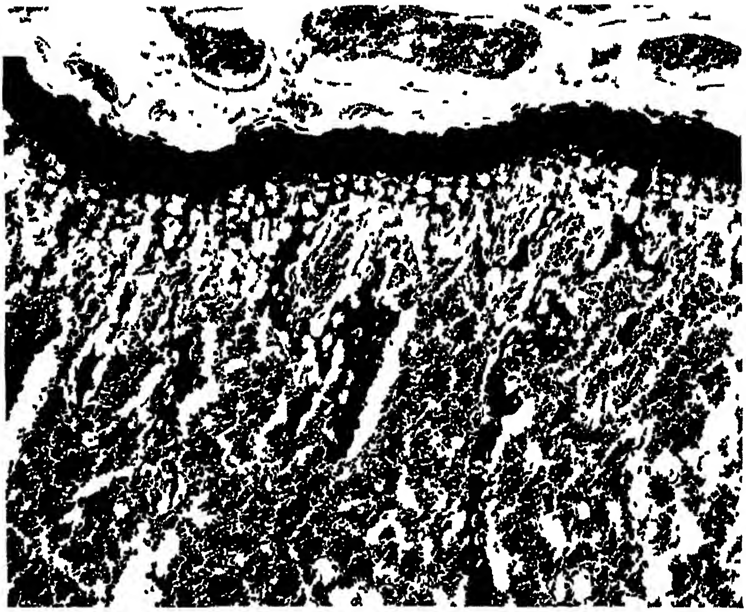

FIGURE 4.—Upper epiphyseal cartilage and adjacent cancellous bone of tibia from animal that died on deficient diet, aged 75 days. Cartilage measures 65μ. There is no active epiphyseal bone growth.

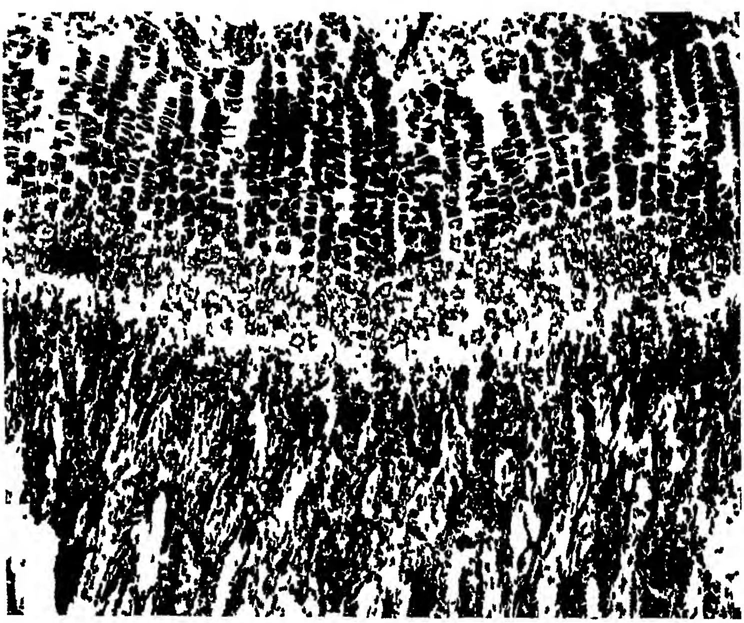

FIGURE 5.—Upper epiphyseal cartilage and adjacent cancellous bone of tibia (treated animal aged 80 days). Cartilage measures 312μ. Note the thick hypertrophic cell layer and the osteoblasts lining the numerous thin cartilaginous and bony cancelli.

small amounts in 11, and in a moderate amount in 1. Although there was more hemosiderin in the treated than in the untreated group, the amount in individual spleens had no constant relationship to the presence or degree of hemorrhage or the amount of hemosiderin in the adrenal.

Testes.—The testes from 20 animals were examined. Of the 14 in the treated group, large, multinucleated, or otherwise abnormal spermatids were present in 8. A few were seen in 3 testes, a moderate number in 2, and in 3 testes they were numerous. Of the 6 testes examined from the untreated controls, these abnormal cells were numerous in 1 and a few were present in 3 others.

Spermatozoa were present in small numbers in 3, and moderate numbers in 4 of the 14 testes examined from the treated group. Of the 6 testes from untreated controls, 1 showed a few spermatozoa and 3 a moderate number. There is a considerable difference in the number of testes with spermatozoa between the 3 treated groups. The 4 testes from the group treated for 6 days showed no spermatozoa. Two of the 4 from the group treated for 10 days showed a few spermatozoa. Of the 7 from the 14-day group, 4 showed a moderate number, and 1 a few spermatozoa. In both groups of animals, the testes showed a few spermatocytes and spermatids which were oxyphilic and occasionally necrotic. The epididymis was not examined in a sufficient number of rats to be significant.

Bone.—When studying a large series of animals that had died on a diet deficient in the filtrate factor, it was noted that the upper epiphyseal cartilage of the tibia was quite thin. This finding led to the study of this cartilage in this experiment.

The average thickness of the cartilage in the 17 untreated controls was 203μ. The hypertrophic layer (preparatory zone) averaged about three cells thick, measuring 71μ. The cartilage of the 31 treated animals averaged 311μ, with a hypertrophic layer averaging 108μ in thickness. This latter zone was usually four or more cells thick. In both the treated and untreated groups the cancellous zone showed slight to moderate congestion and numerous large osteoblasts. In most animals the periosteum of the tibial shaft was cellular and of moderate thickness. It is of interest to compare the above findings with similar features of animals that died while on the deficient diet (unpublished data). The average age of these animals was slightly less than that of the treated group. In these, the cartilage averaged 118μ in thickness; the hypertrophic layer was absent or very thin, being only one to two cells thick. Many animals showed absence or marked retardation in epiphyseal bone growth, cancelli being short and present in very small numbers. Osteoblasts were absent in 4, present in small numbers in 6, and in moderate numbers in 5. In

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most animals, the periosteum of the tibial shaft was seen only as a layer of fibrous tissue with very few small spindle cells. In 1 animal it was thick.

Pancreas.—Pancreas was examined in 5 of the treated and 4 of the untreated animals; it was normal in all.

DISCUSSION

The frequency and degree of adrenal congestion was somewhat greater in the control than in the treated animals. However, no significance is given to the fact since congestion is not necessarily associated with pathological processes. It may merely be a part of an increased or attempted increase in functional activity.

A striking difference is seen when the groups are compared with respect to hemorrhage, atrophy, and necrosis. In the deficient animals, these lesions occurred singly or in combination in 10 of the 16 animals. All 3 types of lesions were seen in 3, hemorrhage and necrosis in 2, hemorrhage and atrophy in 2, atrophy in 2, and hemorrhage in 1. Of the 28 treated animals, only 1 showed active lesions. Reasons were given under the heading "necrosis" for the belief that this adrenal was mislabeled and did not belong in this treated group. It is apparent from this and previous studies of this deficiency that calcification is preceded by necrosis; hence, necrosis had occurred in at least 3 other treated animals. There was no associated hemorrhage or atrophy, which suggests that the necrosis had occurred previous to the beginning of treatment.

Scarring occurred with about equal frequency in the two groups, a finding that was expected since small foci of necrosis do not ordinarily increase in size. Rather the debris is phagocytosed or organized, resulting in the small scars. Fibrosis and hemosiderin deposition, though present in almost all animals of both groups, were slightly more pronounced in the untreated animals. These changes, particularly fibrosis, in the majority of instances were confined to the inner zone, and when in this location were not associated with hemorrhage or necrosis. It is believed that this type of alteration is a continuous process and in the case of fibrosis, irreversible. It was impossible to determine whether or not hemosiderin continued to be deposited during the period of treatment. However, it is believed that the 14 days (longest period) of treatment was too short a time for the previously formed hemosiderin to have been removed.

There was a distinct difference in the appearance of cells of the fascicular and inner zones between treated and untreated groups. In the treated group cells of the fascicular zone showed, except in one case, normal vacuolated oxyphilic cytoplasm, whereas in the untreated group this type of cell was present in only one case. The appearance of the cells of the inner zone was considered within normal limits in

about 30 percent of the untreated animals and in about 88 percent of the treated group.

One of the most striking differences between the adrenals of the two groups is their fat content, particularly in the fascicular zone. Fourteen of the untreated animals showed marked to subtotal depletion of fat in this layer. In the treated group this zone was normal in 6 animals and fat was only slightly depleted in 18 others. The remaining 4 showed moderate depletion in patchy areas. The relationship of cortical fat to cortical hormone is still a much debated question. However, there appears to be general agreement that the relation is close and that the functional state of the gland can be gauged by its fat content (*4*). With this view as a criterion, it is evident that the adrenal cortices of most animals on the deficient diet have partly or completely lost the ability to produce the specific hormone. By the same reasoning, it is apparent that this function is largely restored by treating the deficient animals with pantothenic acid.

Pantothenic acid did not cause the testes to regain their normal appearance or function in 14 days, although the analysis of the animals by length of treatment suggests a trend in this direction. Two male rats, not a part of this experiment proper, but which had been handled in the same manner, were continued on the treatment for 38 days. When killed their testes showed no abnormal cells and spermatozoa were numerous. These testes were considered to be normal.

On the deficient diet rats lose weight or fail to grow. When the animals are treated with pantothenic acid the tibial epiphyseal cartilages are hyperactive, which suggests that skeletal growth is resumed or accelerated.

Many aspects of this and previous studies indicate that we are dealing with various degrees of adrenal cortical insufficiency due to a vitamin deficiency. Reduced fat content of adrenal cortex, reduced rate or lack of growth, loss of abdominal fat and reduced testicular function all lead to the consideration of such a probability. Such lesions as visceral congestion and generalized lymphoid hyperplasia described as occurring in experimental chronic adrenal cortical insufficiency were not observed. With reference to thymus hyperplasia, which has been described as occurring in chronic cortical insufficiency (*5*), it should be stated that most of our animals were under 90 days of age and all were under 107 days. Since these animals were too young to show thymic involution, this organ was not examined.

From this experiment and previous experience, it was noted that hemorrhage and necrosis frequently occurred independently. Not infrequently animals die without showing either hemorrhage or necrosis, other forms of adrenal alteration being present. Although the term "hemorrhagic adrenal necrosis" designates the prominent

pathological feature of this deficiency, a more inclusive title should be found for this condition when more is known concerning the pathologic physiology.

SUMMARY AND CONCLUSION

The adrenal lesions, abnormal testicular function, and cartilage hypoplasia occurring in rats fed on a diet deficient in the "filtrate factor" are markedly affected by supplementing the diet with 100 γ of pantothenic acid daily. Arrest and repair of adrenal lesions occur, testicular function is improved, and skeletal growth is accelerated.

It is suggested that rats develop a partial or complete adrenal cortical insufficiency on the deficient diet.

REFERENCES

(*1*) Daft, Floyd S., Sebrell, W. H., Babcock, S. H., Jr., and Jukes, T. H.: Effect of synthetic pantothenic acid on adrenal hemorrhage and necrosis in rats. Preceding paper in this issue of Public Health Reports.
(*2*) Lillie, R. D.: Romanowsky staining with buffered solutions. III. Extension of the method to Romanowsky stains in general. Stain Technology, 1940. (In press.)
(*3*) Nelson, A. A.: Hemorrhagic cortical necrosis of adrenals in rats on deficient diets. Pub. Health Rep., **54**: 2250 (1939).
(*4*) Zwemer, R. L.: A study of adrenal cortex morphology. Am. J. Pathol., **12**: 111 (1936).
(*5*) Jaffe, Henry L.: The effect of bilateral suprarenalectomy on the life of rats. Am. J. Physiol., **78**: 453 (1926).

PROVISIONAL MORTALITY RATES FOR THE FIRST QUARTER OF 1940

The mortality rates in this report are based upon preliminary data for 30 States, the District of Columbia, Alaska, and Hawaii for the first 3 months of 1940. Comparative data are presented for the same States for the 2 previous years.

This report is made possible through a cooperative arrangement with the respective States, which voluntarily furnish provisional quarterly and annual tabulations of current birth and death records. The reports are analyzed and published by the United States Public Health Service.

Because of lack of uniformity in the method of classifying deaths according to cause as well as some delay in filing certificates, these data are preliminary and may differ in some instances from the final figures subsequently published by the Bureau of the Census.

In the past, these preliminary reports have accurately reflected the trend in mortality rates for the country as a whole. Some deviation from the final figures for individual States may be expected because of the provisional nature of the information. However, it is believed that the trend of mortality within each State is correctly represented. Comparisons of specific causes for different States are subject to error

because of differences in tabulation procedure and completeness of reporting. Such comparisons should be based upon the final figures published by the Bureau of the Census.

The causes of death were classified according to the latest revision of the International List and the numbers in parentheses after each cause are the code numbers of this revision. The number of States reporting for the past quarter is smaller than usual, probably as a result of the change in classification of causes of death which most States are now making.

In general the mortality record of the first 3 months of this year has been favorable. The crude death rate, 11.7 per 1,000 population, was slightly less than the corresponding rate for 1939, 11.8 per 1,000 population, although it was somewhat higher than in 1938. The States reporting a higher death rate in 1940 than in 1939 were all in the South or West.

The principal infectious and contagious diseases were all less prevalent than last year, and for all except influenza the mortality rates were less than those reported in either 1938 or 1939. A minor epidemic of influenza during January and February was responsible for maintaining the death rate from this disease at a relatively high level. The decline in the mortality rate from tuberculosis continued unchecked so that the rate for the first quarter of 1940 was about 5 percent less than that for the corresponding period in 1939. The largest decline was reported for pneumonia, the death rate from this disease being nearly 20 percent less than during the first quarter of 1939. Although it is still too soon to form a definite opinion, it is thought that the use of recently discovered methods of therapy undoubtedly contributed to this decline. Only 4 of the 31 States reported a higher death rate in 1940 than in 1939.

Poliomyelitis was the only communicable disease with a higher death rate than in 1939. The increase was insignificant since this disease is most prevalent during the last half of the year. Increases were reported for the principal diseases of late adult life, cancer, cerebral hemorrhage, diabetes, heart disease, and nephritis. In part, at least, these increases result from an increased proportion of old persons in the population.

The death rate from accidental causes was also higher than in 1938 or 1939. Seventeen of the 31 States reported a higher death rate from automobile accidents than in 1939. The increase was about 3 percent.

The downward trend in the infant and maternal mortality rates continued unchecked; the maternal mortality rate, 3.9 per 1,000 live births, was 15 percent less than that for the first quarter of 1938.

The birth rate, 16.3 per 1,000 population, was slightly higher than that reported during the corresponding period of the two previous years.

Provisional mortality from certain causes in the first 3 months of 1940, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid fever (1–2)	Measles (35)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (grippe) (33)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cerebrospinal (meningococcus) meningitis (6)	Tuberculosis, all forms (13–22)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–195)	Automobile accidents (170a, b, c)
31 States:[1]																								
1940	11.7	16.3	50	3.9	0.5	0.4	0.9	1.8	1.4	31.2	0.3	0.5	0.6	46.9	122.1	31.3	102.4	333.8	87.3	52.8	2.9	87.4	67.4	19.4
1939	11.8	16.1	54	4.1	.6	1.2	1.3	2.8	1.8	32.8	.2	.5	.7	48.3	119.3	29.5	95.8	318.0	107.5	54.0	4.3	85.4	63.8	18.8
1938	11.2	15.6	54	4.6	.7	4.5	1.6	3.8	2.2	21.1	.3	.5	1.2	49.2	114.9	25.9	88.7	285.2	104.7	54.0	4.5	82.9	63.8	20.3
Industrial policyholders, Metropolitan Life Insurance Co.:[3]																								
1940	8.5	----	----	----	.5	.4	.8	1.5	1.3	16.6	----	----	----	45.8	104.9	33.5	67.1	[3] 182.5	57.0	----	[4] 3.7	[5] 63.8	44.4	[6] 14.7
1939	8.8	----	----	----	.4	1.0	1.2	2.3	1.6	18.7	----	----	----	47.4	101.9	30.1	66.0	[3] 183.0	78.4	----	[4] 4.9	[5] 58.3	44.2	[6] 16.6
1938	8.5	----	----	----	.8	2.9	1.9	1.7	2.2	13.4	----	----	----	47.7	94.9	26.9	64.1	[3] 169.4	78.6	----	[4] 5.6	[5] 58.2	46.7	[6] 18.0
Alaska:																								
1940	20.9	25.7	175	(7)	(7)	150.1	(7)	84.0	(7)	18.0	(7)	(7)	(7)	444.2	90.0	(7)	78.0	198.1	180.1	12.0	12.0	12.0	156.1	(7)
1939	13.9	25.6	44	2.4	(7)	(7)	(7)	6.2	6.2	(7)	(7)	6.2	(7)	324.4	68.6	6.2	49.9	205.9	180.9	25.0	(7)	12.5	137.3	(7)
1938	30.9	40.4	74	6.4	(7)	6.4	6.4	173.8	(7)	77.2	(7)	(7)	(7)	740.3	109.4	(7)	225.3	302.6	366.9	64.4	(7)	19.3	315.4	(7)
California:[8]																								
1940	13.2	15.8	42	2.8	.5	.3	(7)	.7	2.1	12.1	.4	.7	.2	62.6	154.6	31.4	100.0	424.7	59.9	72.3	5.3	78.8	89.6	44.2
1939	13.5	15.3	49	2.9	.9	1.8	.6	.8	1.1	6.1	.3	.1	.7	64.5	153.7	29.2	102.6	420.5	84.1	73.7	5.7	84.8	93.2	40.5
1938	13.4	15.5	50	3.3	1.3	1.2	.6	2.7	2.3	8.6	.4	.3	1.2	71.5	147.5	25.7	89.9	396.0	99.9	78.5	7.7	88.6	88.5	40.1
Colorado:																								
1940	12.5	19.4	56	2.3	1.1	2.2	.4	3.0	2.2	25.3	1.1	.4	1.1	50.5	127.8	18.9	95.4	322.4	118.1	69.1	3.0	79.8	74.3	18.6
1939	13.0	18.9	69	5.2	1.1	1.5	1.9	6.4	4.1	50.7	(7)	.4	1.1	54.5	113.1	19.5	105.6	275.5	154.9	63.9	6.4	92.8	71.8	20.7
1938	12.4	18.6	59	5.3	1.1	4.9	1.5	1.9	5.3	23.4	1.1	.4	1.1	64.1	117.0	17.4	98.5	249.0	144.1	75.4	6.0	87.9	75.4	22.6
Connecticut:																								
1940	11.3	13.6	39	3.0	(7)	.5	(7)	.7	.2	8.0	(7)	(7)	.5	35.3	153.5	20.6	122.1	360.4	71.8	46.6	1.6	69.3	52.5	15.1
1939	11.3	13.2	37	2.8	(7)	.7	.5	1.9	1.2	10.4	(7)	(7)	(7)	38.7	146.5	29.9	96.9	280.1	86.0	49.4	2.3	86.0	55.7	15.5
1938	11.2	13.3	35	2.8	(7)	(7)	.7	.5	1.4	7.7	(7)	.2	.5	37.6	141.3	32.5	93.0	276.3	89.5	52.8	4.0	91.8	62.0	17.4

Delaware:																								
1940	13.6	16.4	46	3.7	(7)	(7)	3.0	3.0	(7)	33.5	(7)	(7)	1.5	47.2	155.4	47.2	118.8	431.1	92.9	53.3	3.0	135.6	38.1	12.2
1939	13.7	17.6	49	4.4	(7)	(7)	(7)	4.6	3.1	24.7	(7)	1.5	(7)	70.9	117.2	40.1	120.3	417.9	145.0	54.0	6.2	128.0	67.8	29.3
1938	13.2	15.9	61	3.9	1.5	3.1	(7)	10.8	1.5	27.9	(7)	(7)	1.5	38.7	123.8	34.1	142.4	400.9	114.5	34.1	(7)	108.4	68.1	21.7
District of Columbia:																								
1940	14.8	22.0	48	2.0	(7)	(7)	.6	3.1	.6	21.0	.6	(7)	.6	65.0	149.7	40.8	101.5	421.4	134.9	79.2	5.6	141.7	65.0	16.7
1939	14.3	21.1	49	5.4	.6	(7)	(7)	1.9	.6	21.4	(7)	.6	1.3	70.6	160.8	32.2	93.3	403.7	110.4	79.5	7.6	111.0	75.7	18.3
1938	13.7	20.3	52	4.4	(7)	.6	1.9	.6	1.9	8.9	(7)	1.3	2.6	69.6	131.6	24.9	93.9	355.1	152.0	70.2	5.1	118.2	67.1	21.1
Florida: [8]																								
1940	17.0	17.2	63	7.1	.7	(7)	.3	1.4	2.1	87.4	(7)	.7	.3	54.5	115.0	32.9	163.2	451.6	110.5	80.1	4.9	123.7	123.7	44.7
1939	13.6	17.1	65	5.9	.7	.7	.4	2.9	1.4	38.8	(7)	.4	1.1	56.1	97.5	26.3	116.2	307.9	83.1	83.4	11.1	102.1	116.5	47.5
1938	14.3	16.9	52	7.8	1.8	.7	.4	2.2	1.8	41.6	(7)	.7	1.1	58.4	107.3	27.7	117.9	326.6	111.0	78.8	5.5	110.2	95.3	42.7
Hawaii:																								
1940	7.0	19.6	55	1.7	3.4	(7)	(7)	3.4	2.5	5.1	1.7	(7)	.8	66.6	59.0	14.3	44.7	118.0	48.1	43.8	5.1	59.9	42.2	7.6
1939	6.9	16.6	62	5.2	3.5	(7)	(7)	2.6	2.6	4.3	(7)	(7)	(7)	56.4	52.1	18.2	37.3	129.4	57.3	55.6	10.4	57.3	43.4	11.3
1938	7.2	19.9	56	3.1	1.8	(7)	.9	8.0	.9	5.3	1.8	(7)	.9	59.3	63.8	11.5	50.5	116.9	71.7	61.1	17.7	68.2	39.0	9.7
Idaho:																								
1940	9.6	22.2	38	5.0	(7)	1.6	2.4	(7)	.8	25.2	(7)	.8	3.2	16.6	87.5	18.1	62.3	258.7	55.2	49.7	2.4	66.2	72.6	18.9
1939	10.4	21.1	58	2.3	4.0	.8	.8	2.4	.8	28.1	(7)	.8	4.0	19.3	94.8	26.5	88.3	277.9	106.0	54.6	2.4	52.2	75.5	25.7
1938	9.4	20.9	45	5.0	2.4	1.6	.8	3.2	(7)	21.9	(7)	1.6	1.6	21.9	67.3	13.8	68.1	181.7	118.4	60.0	1.6	56.0	62.4	24.3
Illinois:																								
1940	12.4	13.8	41	3.4	.4	.1	1.4	.7	1.3	20.0	.1	.4	.2	47.3	142.6	40.3	94.3	397.1	76.2	61.0	1.5	103.3	64.7	24.1
1939	12.6	13.9	45	3.5	.3	.1	1.8	2.9	2.1	35.6	.2	.3	.2	48.9	140.6	33.3	83.0	400.6	103.7	58.4	1.8	112.5	59.3	22.2
1938	11.5	14.3	44	3.6	.3	7.1	3.2	.6	1.6	10.5	.2	.4	.4	46.1	132.6	31.0	78.6	341.5	92.8	61.6	3.0	100.0	62.3	22.6
Indiana:																								
1940	12.8	16.0	46	3.3	.6	(7)	2.3	2.8	1.4	49.9	.2	.1	(7)	39.4	121.8	19.4	162.3	360.4	97.3	(9)	2.5	84.1	70.6	26.9
1939	12.8	15.7	49	4.2	.3	.2	2.4	1.0	1.9	69.2	(7)	.7	.6	44.2	112.5	20.8	146.3	275.9	138.7	(9)	2.8	67.8	61.8	23.4
1938	11.6	15.8	44	4.6	.2	6.3	3.0	2.0	3.1	22.8	.5	.9	1.2	42.7	114.0	17.3	129.8	256.6	103.8	(9)	3.0	64.7	65.1	26.3
Iowa: [8]																								
1940	10.9	(9)	(9)	(9)	.7	.2	.9	.2	.5	39.1	.7	2.4	.5	14.4	125.5	26.3	121.0	308.1	77.9	47.4	1.2	72.7	57.3	15.4
1939	10.9	17.3	43	1.5	.7	2.4	1.4	2.2	.5	31.1	(7)	1.2	1.2	19.0	120.2	31.8	116.1	294.9	91.1	59.7	1.7	60.9	64.3	15.9
1938	10.5	16.9	41	4.0	.5	.5	3.9	4.1	1.2	23.9	.5	.5	1.0	20.5	139.2	24.9	118.9	262.4	96.4	60.7	3.1	67.4	62.6	15.5
Kansas:																								
1940	11.1	13.7	45	4.4	(7)	1.9	.9	1.5	1.1	43.5	(7)	.6	1.1	23.3	119.9	30.3	107.1	297.2	56.3	57.2	1.9	108.4	67.6	17.9
1939	10.8	14.2	48	4.9	.6	.2	1.3	.4	1.1	38.7	(7)	1.7	.4	24.2	112.9	34.8	90.4	270.4	82.6	52.3	2.8	104.0	89.1	16.9
1938	10.8	15.3	48	4.4	.2	2.8	3.1	3.3	.6	25.3	(7)	.4	.6	27.9	119.6	26.4	94.5	252.3	95.8	58.2	2.6	109.2	93.9	22.2
Kentucky:																								
1940	10.9	(9)	(9)	(9)	.8	1.1	.8	3.9	1.7	60.2	1.2	.4	.8	69.2	74.3	15.3	111.7	226.9	100.6	48.2	4.0	71.5	69.5	16.9
1939	11.0	20.2	45	4.2	1.9	3.0	1.8	1.8	3.8	68.2	.4	1.2	1.8	63.0	75.5	15.2	99.2	214.9	119.8	46.3	5.2	66.6	58.8	18.7
1938	9.4	20.4	52	4.1	1.2	5.2	1.5	8.4	3.2	43.6	.8	.3	3.3	62.6	58.2	13.4	89.5	166.6	104.6	34.6	4.1	65.3	49.1	17.2
Louisiana: [8]																								
1940	15.5	22.4	79	6.2	2.5	.8	(7)	8.5	4.2	100.4	.8	.3	.3	69.6	97.9	27.2	94.8	371.5	174.6	67.1	7.9	131.3	92.5	25.2
1939	12.2	21.3	72	6.1	6.0	8.1	.3	3.5	3.5	45.2	.3	.6	.3	61.0	81.2	18.4	85.5	248.0	149.8	62.2	8.1	124.4	62.2	17.6
1938	12.3	19.9	74	6.5	5.5	.6	.6	4.9	2.0	59.0	.9	.3	1.7	72.6	86.4	21.7	65.3	227.5	152.3	60.7	8.4	106.7	69.7	18.8
Maine:																								
1940	12.8	16.4	57	5.7	.5	1.4	1.9	2.3	1.4	22.4	(7)	.5	1.9	25.2	133.0	34.1	133.4	389.1	71.4	53.2	7.5	87.2	63.5	19.6
1939	14.0	16.8	67	4.2	2.4	.9	.5	4.7	6.6	32.5	(7)	(7)	.5	33.5	149.0	29.7	135.8	422.5	113.6	49.0	4.7	81.1	52.8	12.3
1938	12.9	17.9	50	4.5	1.9	3.8	(7)	3.8	1.4	23.6	.5	(7)	(7)	33.1	145.1	27.9	122.4	345.5	105.9	56.7	7.1	96.0	58.6	14.7
Maryland:																								
1940	15.7	18.0	58	3.7	.7	.2	.7	4.0	.7	24.3	.5	.2	.5	97.2	148.7	43.9	126.3	452.0	125.6	55.2	3.1	184.3	78.4	20.3
1939	14.4	17.6	55	2.7	.5	2.6	.5	1.4	2.4	23.0	(7)	.7	1.2	80.9	138.1	32.6	122.6	396.9	136.5	52.2	4.3	153.2	73.3	18.7
1938	13.4	17.7	56	2.9	.2	.7	1.2	4.6	1.0	16.1	(7)	1.9	1.2	81.4	129.8	32.8	101.9	366.8	135.1	56.1	3.6	139.0	67.4	21.9

See footnotes at end of table.

Provisional mortality from certain causes in the first 3 months of 1940, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																			
			Total infant mortality	Maternal mortality	Typhoid fever (1–2)	Measles (35)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (grippe) (33)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cerebrospinal (meningococcus) meningitis (6)	Tuberculosis, all forms (13–22)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–195)	Automobile accidents (170a, b, c)
Michigan:[8]																								
1940	11.3	17.4	53	3.8	0.2	0.5	1.2	1.2	0.6	9.4	(7)	0.2	0.1	34.9	123.2	31.2	101.8	350.4	73.1	64.0	5.2	58.0	67.8	27.1
1939	11.8	17.6	56	3.8	.5	1.3	1.8	1.5	1.1	17.9	(7)	.1	.4	38.9	125.9	32.2	97.6	332.3	108.8	60.1	4.7	64.5	66.3	20.8
1938	11.0	18.1	48	3.9	1.3	1.9	3.2	1.9	1.1	13.3	(7)	.5	.6	39.9	118.1	29.6	96.4	308.2	87.1	60.0	5.1	59.5	61.4	22.5
Minnesota:																								
1940	10.6	18.8	37	2.3	.1	.3	1.2	.7	.4	18.8	.3	.9	.4	26.6	136.4	31.7	105.7	315.0	84.5	50.6	2.1	45.4	56.9	14.9
1939	10.8	18.2	45	2.9	.2	5.9	.5	.8	.8	24.4	(7)	.3	.5	30.4	138.2	29.5	102.8	285.7	91.3	60.8	3.3	47.2	59.9	13.6
1938	10.0	17.7	40	4.0	.3	.3	2.3	2.6	.3	14.3	.4	.3	.4	29.3	139.4	26.9	90.5	255.9	93.2	52.8	1.7	44.1	57.0	18.6
Mississippi:																								
1940	13.1	(9)	(9)	(9)	.6	.4	(7)	5.5	2.5	113.7	1.2	.8	.8	48.2	65.5	18.1	91.9	190.0	96.0	45.1	2.5	122.9	73.3	19.7
1939	11.9	(9)	(9)	(9)	.6	6.5	.2	9.3	1.8	84.3	1.0	1.0	2.0	49.5	60.8	14.1	83.3	172.6	114.0	45.7	3.6	98.8	66.1	20.0
Missouri:																								
1940	12.2	16.4	43	3.7	1.4	.5	1.4	1.3	2.5	39.9	.1	.5	.3	44.8	130.4	32.4	102.4	323.8	116.6	58.2	3.4	114.4	66.2	17.8
1939	12.0	17.0	52	3.4	1.1	.4	1.8	2.1	2.7	30.1	.5	.6	1.0	48.9	126.9	27.3	98.6	272.0	130.0	59.2	5.7	116.4	66.3	20.9
1938	12.3	15.9	57	4.5	2.0	9.6	4.2	7.2	4.6	30.0	.7	.4	.8	51.8	122.6	24.9	91.9	287.8	141.2	57.3	4.2	107.1	72.5	26.0
Montana:																								
1940	10.3	20.0	39	4.3	(7)	2.9	3.6	1.4	.7	21.0	(7)	.7	1.4	44.2	114.5	8.0	98.6	230.4	63.8	68.1	3.6	65.2	66.7	19.6
1939	11.7	18.3	66	4.8	2.2	8.8	1.5	8.1	.7	35.4	(7)	2.2	.7	39.1	112.8	16.2	94.4	258.1	118.7	65.6	5.2	62.7	88.5	19.2
1938	10.7	19.3	45	5.0	.7	1.5	2.2	5.2	1.5	33.5	(7)	(7)	1.5	46.1	84.8	24.6	93.8	224.7	116.8	55.8	3.7	76.5	77.4	19.3
Nebraska:[8]																								
1940	10.6	15.7	37	2.3	(7)	(7)	1.8	(7)	.9	41.0	(7)	(7)	.9	18.7	122.2	36.1	128.0	276.0	73.6	50.4	.9	64.2	52.2	9.4
1939	9.7	16.0	36	2.8	1.4	1.4	.9	.5	.9	25.8	(7)	1.4	.5	15.4	107.8	27.2	95.6	204.6	99.2	56.2	1.8	68.8	62.5	13.6
1938	9.0	16.4	40	3.3	.9	(7)	.5	2.3	1.4	20.0	(7)	(7)	.9	12.7	117.0	25.4	78.5	233.6	84.8	45.8	2.7	58.5	50.3	15.9
Nevada:																								
1940	12.8	19.9	39	5.8	(7)	(7)	(7)	(7)	(7)	11.6	3.9	(7)	3.9	42.5	116.0	19.3	85.1	290.0	131.5	81.2	(7)	61.9	131.5	42.5
1939	12.6	18.8	55	2.1	(7)	3.9	(7)	(7)	(7)	15.7	(7)	(7)	(7)	55.1	129.9	3.9	86.6	334.7	165.4	39.4	(7)	70.9	78.7	15.7
1938	12.2	17.0	56	4.7	4.0	(7)	(7)	(7)	4.0	4.0	(7)	(7)	(7)	87.5	99.4	15.9	71.6	302.2	163.0	51.7	(7)	75.5	107.4	36.8
New Jersey:																								
1940	11.4	12.7	40	2.4	.3	.1	.9	.6	.6	9.7	.2	.2	(7)	41.1	133.5	40.7	96.1	384.4	70.7	49.0	2.0	86.5	54.3	15.4

1939	11.5	12.9	47	3.5	.2	(7)	1.3	2.1	.7	13.9	.2	.7	.6	44.7	132.0	38.1	91.7	389.0	87.7	55.9	3.3	78.2	48.0	16.5
1938	10.7	12.9	43	3.3	.1	1.2	.4	1.3	1.3	8.1	.1	.7	1.0	45.6	122.7	30.8	85.0	343.6	89.8	57.8	3.4	80.1	51.2	18.5
New Mexico:																								
1940	13.8	42.0	76	3.6	2.8	(7)	(7)	8.5	.9	33.8	(7)	(7)	(7)	91.2	63.9	14.1	66.7	154.1	100.5	57.3	9.4	67.7	104.3	43.2
1939	16.6	35.3	125	7.0	1.0	1.9	1.9	9.5	9.5	64.7	1.0	(7)	2.9	100.9	64.7	10.5	49.5	155.2	227.5	77.1	10.5	72.4	89.5	45.7
1938	13.6	32.6	94	4.7	3.8	23.1	(7)	26.9	4.8	32.7	1.0	(7)	1.0	94.2	59.6	3.8	55.7	156.6	148.0	72.1	14.4	58.6	87.5	34.6
New York:																								
1940	11.4	14.1	39	3.4	.1	.2	.5	1.3	.1	6.4	(18)	.9	.3	49.1	158.6	45.5	81.8	439.0	67.9	60.7	2.9	73.5	58.6	14.1
1939	12.9	14.6	46	3.2	.2	.5	.8	1.1	.3	8.9	(7)	.3	.7	52.6	158.7	45.2	74.1	439.8	102.3	61.5	5.3	82.1	58.4	13.5
1938	12.3	14.4	45	4.0	.2	.2	.7	1.2	.5	6.9	.1	.7	1.1	52.3	156.8	38.7	72.4	399.8	99.1	61.7	5.2	81.3	61.4	17.3
North Carolina:																								
1940	10.4	21.3	69	5.8	.7	.6	.4	2.1	4.7	60.7	.1	.1	.6	52.4	57.5	17.9	95.6	158.2	101.9	40.6	5.3	109.9	63.0	23.3
1939	9.6	21.3	65	5.5	.6	2.8	.7	7.2	4.6	34.4	.1	.3	.5	53.4	58.3	14.0	87.4	166.9	102.6	46.7	6.1	86.9	58.5	21.7
1938	10.3	22.4	63	6.3	.7	10.0	.6	4.7	6.3	29.4	.2	.7	1.6	54.0	54.2	11.6	86.5	174.1	128.0	49.9	6.0	95.6	62.3	21.3
North Dakota:																								
1940	7.7	19.2	45	2.1	1.1	.6	2.3	1.7	2.3	15.8	(7)	1.7	(7)	18.1	96.6	26.0	69.5	188.1	45.2	46.3	4.5	38.4	44.6	12.4
1939	8.2	19.4	59	3.8	.6	6.3	2.9	2.9	.6	30.3	(7)	1.1	1.1	22.3	87.4	29.1	71.4	189.6	78.3	45.7	8.0	45.7	29.1	7.4
1938	7.3	18.9	44	1.2	.7	1.1	1.7	12.0	.6	10.3	(7)	(7)	1.2	20.6	84.2	22.9	59.0	146.6	66.4	49.8	5.2	46.4	42.4	10.9
Ohio:																								
1940	13.0	15.8	44	3.9	.6	(7)	1.1	1.9	.7	28.5	.1	.3	.8	44.7	142.5	34.1	126.2	369.9	89.2	55.7	3.4	89.3	88.7	26.0
1939	13.1	14.4	55	4.0	.3	.2	2.0	1.3	1.5	40.1	.1	.9	.4	46.7	134.2	33.6	127.6	351.9	112.7	61.8	3.4	90.2	76.7	23.8
1938	12.0	16.1	49	3.5	.4	5.1	2.1	2.0	1.6	20.2	.2	.4	1.1	48.8	127.6	28.2	112.0	300.7	96.0	57.3	3.5	83.1	79.8	23.3
Oklahoma:																								
1940	9.2	16.6	54	3.5	1.1	.3	.5	1.2	4.3	48.9	1.5	.3	1.9	45.5	71.8	17.6	79.2	172.9	97.2	45.0	2.6	57.4	50.9	15.5
1939	9.5	17.0	63	4.1	2.2	6.0	1.6	1.9	3.3	43.7	.5	.6	.2	42.1	69.7	15.7	82.9	165.2	118.3	42.9	4.1	61.3	100.8	21.8
1938	9.0	18.5	49	4.7	2.2	1.1	1.4	9.8	7.0	34.6	1.7	.2	1.7	54.1	75.4	14.4	75.4	126.8	96.1	50.8	6.0	66.6	64.4	17.4
Oregon:																								
1940	12.6	16.0	35	3.1	1.5	.4	(7)	(7)	2.7	29.1	(7)	1.1	1.1	27.1	142.6	30.6	118.5	344.1	63.8	48.9	.4	132.7	97.5	32.1
1939	12.2	15.1	46	2.1	.4	(7)	.4	.8	(7)	14.8	.4	.8	.8	28.8	135.7	31.1	131.0	307.6	76.6	35.0	.4	136.5	77.0	26.1
1938	12.2	15.7	33	3.8	(7)	(7)	1.6	1.6	1.2	16.5	.8	2.7	1.2	28.2	131.3	25.1	107.4	299.0	81.9	45.5	1.2	120.3	70.9	17.6
Pennsylvania: [9]																								
1940	12.8	13.6	58	3.2	.7	.2	1.0	1.2	.8	31.8	.5	.4	1.4	41.8	122.7	45.4	96.6	399.7	93.5	53.6	4.0	114.5	55.3	14.3
1939	11.9	15.7	53	3.5	.8	.2	.9	2.0	1.2	18.0	.1	.6	.9	41.1	121.9	39.4	93.4	364.9	82.9	53.0	4.9	94.5	49.8	12.8
1938	12.0	16.3	53	3.6	.5	4.9	2.0	1.6	1.8	20.4	(7)	.8	.9	42.1	118.1	37.4	89.6	347.4	98.0	55.5	4.5	85.3	60.6	16.3
South Carolina:																								
1940	11.6	18.8	93	7.4	.6	.6	.2	2.5	2.5	86.8	.8	.2	.2	50.0	53.8	17.7	110.0	216.0	110.6	36.5	1.3	98.0	78.8	25.8
1939	9.2	17.4	78	6.4	2.1	.4	.4	7.7	1.7	45.8	.6	.2	.6	38.3	44.7	13.1	96.5	170.4	97.4	15.2	1.5	70.8	54.8	23.5
1938	10.1	17.2	87	8.0	1.7	9.9	1.1	8.8	1.5	65.4	.4	.2	.6	40.9	44.5	11.8	82.4	185.9	125.6	15.3	.4	79.6	54.4	23.4
Tennessee:																								
1940	11.2	15.2	71	5.9	.3	1.1	.9	2.7	1.6	69.9	.1	.3	.7	76.1	69.1	18.9	93.4	221.9	126.2	49.1	2.2	62.9	62.3	13.0
1939	9.5	14.2	64	5.7	.7	2.1	.4	3.6	2.2	56.7	.6	.1	1.1	71.8	63.2	11.6	76.4	169.4	107.9	52.0	3.3	56.0	51.6	16.0
1938	9.5	14.7	63	6.9	.7	10.7	.6	6.2	3.5	46.9	.7	.6	2.5	74.4	64.0	10.8	79.7	152.6	121.0	47.2	2.6	59.7	57.4	19.4
Utah:																								
1940	9.4	24.5	41	2.8	(7)	2.3	3.1	1.5	(7)	24.7	.8	.8	.8	18.5	95.5	16.2	69.3	268.9	50.9	48.5	2.3	62.4	69.3	28.5
1939	9.2	24.4	49	3.2	(7)	(7)	(7)	(7)	(7)	14.0	(7)	.8	2.3	21.8	94.2	14.8	42.8	269.3	72.4	66.2	.8	69.3	57.6	20.2
1938	9.5	21.3	52	3.2	(7)	3.1	3.1	4.7	(7)	21.0	(7)	(7)	4.7	21.0	84.2	22.6	50.7	245.7	88.9	60.0	3.9	56.9	81.9	34.3
Vermont:																								
1940	10.9	17.0	42	1.8	1.0	(7)	(7)	2.1	(7)	25.7	(7)	(7)	1.0	38.0	114.9	19.5	124.1	340.6	86.2	32.8	4.1	80.0	45.1	8.2
1939	12.4	14.5	37	5.0	(7)	(7)	1.0	5.2	1.0	38.6	(7)	1.0	1.0	37.5	139.7	34.4	139.7	367.0	146.0	44.8	5.2	77.1	64.6	20.9
1938	12.3	14.8	55	3.5	(7)	10.5	(7)	4.2	(7)	24.2	(7)	(7)	(7)	45.2	121.9	30.5	120.0	339.4	134.5	65.1	2.1	87.2	49.4	12.6

See footnotes at end of table.

Provisional mortality from certain causes in the first 3 months of 1940, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid fever (1–2)	Measles (35)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Influenza (grippe) (33)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cerebrospinal (meningococcus) meningitis (6)	Tuberculosis, all forms (13–22)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–195)	Automobile accidents (170a, b, c)
Virginia:																								
1940	12.4	17.3	78	4.6	0.6	0.7	0.4	4.9	2.4	63.3	0.3	0.9	1.6	56.8	75.7	23.2	111.2	284.4	120.8	40.1	4.0	118.2	74.8	20.9
1939	11.5	17.0	77	6.6	.3	.4	.4	6.0	3.7	47.2	.1	.4	1.6	61.9	73.6	20.2	112.2	252.9	111.4	40.0	2.1	89.4	64.7	21.1
1938	11.2	17.5	73	5.6	1.2	6.2	.3	7.7	3.3	36.5	(7)	.1	2.2	68.9	71.7	18.7	94.1	245.2	112.6	40.9	3.6	85.7	59.1	21.2
West Virginia:																								
1940	9.6	16.4	72	5.3	1.2	(7)	1.2	3.9	2.5	38.5	.8	.6	2.1	47.9	64.2	18.5	80.9	174.5	79.6	39.7	5.1	72.8	91.5	15.2
1939	9.0	17.4	69	4.4	2.3	.6	2.1	2.5	1.7	32.0	.2	.6	1.9	44.0	64.0	17.5	76.1	173.4	91.6	44.9	4.0	63.6	58.1	15.0
1938	9.6	19.0	68	4.6	1.7	14.6	1.7	10.7	3.8	37.9	1.3	.6	2.8	50.3	64.8	16.0	73.6	168.2	110.6	44.7	5.1	71.3	69.3	17.3
Wisconsin:																								
1940	11.5	17.0	42	3.8	(7)	.7	.8	.5	.4	26.0	.1	.4	.4	27.5	142.8	33.3	111.0	344.1	80.0	(9)	3.2	64.8	77.3	19.1
1939	12.1	16.9	52	3.7	.1	1.1	1.6	2.6	.4	39.0	.1	.3	.3	31.0	137.6	36.8	102.5	375.9	90.7	(9)	4.9	68.5	68.6	15.2
1938	10.8	17.2	47	2.5	.3	1.4	1.6	1.6	.7	10.9	.3	.4	.1	30.6	136.4	32.8	100.2	307.1	84.5	(9)	2.9	69.5	54.3	13.0
Wyoming:																								
1940	8.4	17.2	41	5.8	(7)	(7)	(7)	(7)	3.3	13.4	1.7	1.7	3.3	13.4	80.1	16.7	81.8	210.3	38.4	51.7	1.7	68.4	81.8	40.1
1939	9.8	19.1	59	3.6	1.7	1.7	(7)	1.7	3.4	25.5	(7)	(7)	(7)	20.4	88.2	15.3	76.4	249.4	84.8	49.2	1.7	83.1	83.1	18.7
1938	9.3	16.9	60	7.1	(7)	(7)	(7)	29.1	1.7	27.4	(7)	(7)	1.7	18.8	97.5	15.4	61.6	215.6	104.4	71.9	8.6	47.9	85.6	34.2

[1] Includes all States with data for the 3-month period of 1940, 1939, and 1938. The District of Columbia is included as a State. Estimated population July 1, 1940, 77,305,000.
[2] These data are taken from the April 1939 and April 1940 Statistical Bulletins published by the Metropolitan Life Insurance Co. All figures are provisional and are subject to correction, since they are based on provisional estimates of lives exposed to risk. Data do not include all diseases reported to the Public Health Service.
[3] Excludes pericarditis, acute endocarditis, and acute myocarditis.
[4] Classified as diarrhea and enteritis, age not specified.
[5] Excludes collisions between automobiles and trains or street cars.
[6] Chronic nephritis only.
[7] No deaths reported.
[8] January and February only.
[9] Data not available.
[10] Less than 0.1 per 100,000 population

COMFORT DURING HOT WEATHER [1]

During the summer months many people are concerned about safeguarding health and increasing personal comfort and efficiency. The observance of the following procedures will do much to lessen the discomfort ordinarily experienced during the hot season.

Food.

The influence of a warm climate on the amount of food required by an individual is commonly exaggerated. The temperature of the body is adjusted not so much by increasing or diminishing the amount of heat we produce, as by regulating the amount of heat lost. It is therefore desirable during hot weather to increase the intake of fluids which will promote sweating, a mechanism by which the skin is cooled. Fresh fruits and vegetables are excellent sources of fluid and in addition contain food elements much needed by the body during hot weather. As a general consideration fried foods and rich pastries should be curtailed as foods of these types tend to increase heat production.

Drink.

Attention has already been called to the necessity of drinking adequate amounts of water (6 to 8 glasses a day) to induce sweating. Fruit juices are excellent hot weather drinks, being palatable and effective in quenching thirst. Avoid large amounts of sweetening and the excessive use of alcohol.

When on motor trips drink only from wells and springs approved by the health department. In many States, the State health department has signs posted denoting safe water supplies. When in doubt it is advisable to inquire of local authorities.

When sweating is profuse a large amount of sodium chloride is lost. When excessive, the loss of fluid and of chlorides from the blood may lead to heat cramps and to heat exhaustion. It is believed that these conditions may be prevented by the drinking of an occasional glass of water to which a small amount of table salt has been added. Three or four grains of salt to a pint of water should be sufficient.

Clothing.

The weight, texture, and color of the clothing have a great influence on the loss of heat through the evaporation of moisture from the skin. A safe and comfortable body temperature is maintained by free evaporation of sweat from the surface of the body. To aid in such evaporation, the clothing should be loose and of such character as to permit the easy passage of air. Materials such as cotton or linen aid most in avoiding the burning effect of the hot sun. It should be remembered

[1] This material is available in leaflet form and may be obtained by addressing the Surgeon General, U S Public Health Service, Washington, D C.

that dark colors absorb the sun's rays and are, therefore, warm in hot weather. White clothes reflect the rays of the sun and are cool in hot weather.

Exercise.

Light exercise adapted to your own strength and condition of health is preferable. All forms of active physical exercise immediately before or after meals should be avoided. Swimming is one of the best sports for the hot weather since it does not cause overheating of the body.

Refrain from all strenuous exercise during the hottest part of the day.

Sleep.

A comfortable night's rest during the severe heat waves of the summer will make the next day's heat seem less oppressive and maintain good health. The use of an oscillating electric fan which keeps air in motion without harmful direct drafts will help to insure a good night's sleep.

It is particularly beneficial to observe regular hours of sleep during the summer.

Bathing.

Frequent bathing helps to keep the body cool and refreshed. The shower bath is recommended as it does not have the sedative and weakening effects of the long tub bath.

Exposure to Sun.

It is best to begin with brief exposure each day until the skin becomes lightly tanned, after which the body may be exposed to the rays of the sun for longer periods. Persons with sensitive skins should be especially careful as overexposure to direct sun rays may cause severe burns.

To be comfortable during hot weather, live sensibly, form regular habits of living, get plenty of rest, and above all try to acquire a cheerful and philosophical outlook on life.

COURT DECISION ON PUBLIC HEALTH

License for sale of soft drinks.—(Minnesota Supreme Court; *State* v. *Comer*, 290 N.W. 434; decided February 2, 1940.) The defendant was found guilty in the trial court of selling soft drinks without first procuring a license from the division of hotel inspection of the Minnesota Department of Health.

The facts were that the defendant, who operated a gasoline filling station, sold at his station, without having a license to do so, soft drinks which were consumed by the purchaser directly from the original bottle, no drinking glasses or other conveniences being provided. In

addition to the soft drinks there were retailed at the station more than 40 different articles for automobile and household use.

The State statutes required the procuring of a license from the division of hotel inspection by a person operating a place of refreshment, which included a place where drinks were sold or served at retail. The statutes provided, however, that a general merchandise store or grocery store retailing or serving soft drinks should not be deemed a place of refreshment if such soft drinks were sold and delivered to the public in an original container and the purchaser thereof consumed the contents directly from the original container.

The supreme court, in passing on the matter on appeal, agreed with the defendant's contention that he did not conduct a place of refreshment within the meaning of the statutes and, consequently, did not have to have a license. The court took the view that "the present exempting provision is broad enough to include within the category of 'general merchandise store' a filling station retailing more than 40 different articles and dealing in commodities for both automobile and home use." "The term 'general merchandise store,'" said the court, "must be understood in a broad rather than a restricted sense so that constitutionality can be preserved."

DEATHS DURING WEEK ENDED JULY 13, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 13, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,927	7,670
Average for 3 prior years	8,126	
Total deaths, first 28 weeks of year	246,419	244,231
Deaths under 1 year of age	448	471
Average for 3 prior years	525	
Deaths under 1 year of age, first 28 weeks of year	14,117	14,497
Data from industrial insurance companies:		
Policies in force	65,102,755	67,044,842
Number of death claims	11,048	11,529
Death claims per 1,000 policies in force, annual rate	8 9	9.0
Death claims per 1,000 policies, first 28 weeks of year, annual rate	10.1	10 9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 20, 1940

Summary

For the week ended July 20, 1940, decreases were noted in the incidence of diphtheria, influenza, measles, scarlet fever, smallpox, whooping cough, and Rocky Mountain spotted fever as compared with the preceding week. Slight increases were noted in the incidence of meningitis, poliomyelitis, typhoid fever, and endemic typhus fever. Of the nine communicable diseases appearing in the following table, only measles was higher than the seasonal expectancy, based on the 1935–39 median.

The trend of poliomyelitis continued upward, conforming closely to the seasonal pattern, but with an appreciably lower incidence than the corresponding weekly median. The current incidence of 119 cases compares favorably with the report of 137 cases for the corresponding week last year.

A total of 345 cases of typhoid fever was reported as compared with 238 for the preceding week and with a 1935–39 median figure of 548 cases. The principal increases over the preceding week were noted in the South Atlantic and the South Central States.

A total of 33 cases of meningitis was scattered among 20 States. While this was a slight increase over the 22 cases reported for the preceding week, the accumulated total for the first 29 weeks of the current year is 1,025 cases as compared with 1,259 for the first 29 weeks of 1939. If the present trend continues, 1940 will prove to be the lowest year on record since weekly reports of meningitis cases have been available.

Telegraphic morbidity reports from State health officers for the week ended July 20, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939	
NEW ENG.												
Maine	2	1	1	------	------	------	98	25	25	1	0	0
New Hampshire	0	0	0	------	------	------	2	2	2	0	0	0
Vermont	0	0	0	------	------	------	12	29	23	0	0	0
Massachusetts	2	5	5	------	------	------	605	207	167	0	0	1
Rhode Island	0	0	0	------	------	------	41	29	19	1	1	0
Connecticut	0	1	2	------	1	1	36	49	41	0	0	0
MID. ATL.												
New York	5	11	16	------	[1] 3	[1] 3	486	491	660	2	1	4
New Jersey	6	1	5	1	3	2	273	15	171	1	2	1
Pennsylvania	3	10	23	------	------	------	201	61	277	2	6	4
E. NO. CEN.												
Ohio	3	13	13	4	2	3	21	7	127	1	0	2
Indiana [2]	4	2	7	3	8	8	4	8	16	2	1	1
Illinois [4]	14	19	19	4	2	6	123	15	58	0	2	2
Michigan [3]	3	5	10	------	------	------	241	73	115	2	2	1
Wisconsin	2	2	2	6	2	13	390	124	124	0	0	0
W. NO. CEN.												
Minnesota	1	0	5	1	1	------	23	17	25	1	0	0
Iowa	0	1	6	2	------	------	53	64	18	1	0	1
Missouri [2]	4	5	5	------	------	11	11	1	10	0	0	1
North Dakota	0	5	0	------	------	------	0	2	2	0	0	0
South Dakota [2]	1	0	0	------	------	------	3	8	1	0	0	0
Nebraska	0	1	1	------	------	------	3	2	7	0	0	0
Kansas	6	2	2	------	1	3	41	21	17	0	1	1
SO. ATL.												
Delaware [2]	0	0	0	------	------	------	0	4	4	0	0	0
Maryland [2 3 4]	1	1	5	2	1	2	5	10	25	0	0	2
Dist. of Columbia	2	1	6	------	------	------	1	14	14	0	0	0
Virginia [2]	13	10	8	17	20	------	45	47	47	5	0	2
West Virginia [3]	3	9	3	1	10	10	6	3	11	0	0	2
North Carolina [4]	1	11	11	------	4	------	51	32	32	0	1	2
South Carolina [4]	3	3	3	46	110	58	3	3	8	1	0	1
Georgia [2 4]	1	8	8	9	25	------	9	6	0	0	1	1
Florida [4]	0	4	4	------	4	1	5	7	7	0	0	0
E. SO CEN.												
Kentucky	3	2	2	------	------	------	24	4	50	2	1	2
Tennessee [2]	1	2	5	4	20	14	25	3	19	0	2	2
Alabama [4]	5	7	11	14	7	7	76	26	6	4	2	2
Mississippi [3]	1	7	8	------	------	------	------	0	------	0	1	0
W. SO. CEN.												
Arkansas	3	3	3	1	10	3	5	8	6	0	1	0
Louisiana [4]	2	7	9	4	14	13	3	36	4	0	0	1
Oklahoma	3	1	4	2	4	6	6	5	7	1	0	0
Texas [4]	12	10	23	56	31	31	118	54	54	1	1	1
MOUNTAIN												
Montana	2	0	0	1	3	------	7	42	33	2	0	0
Idaho	0	0	0	------	------	------	3	2	9	0	0	1
Wyoming [2]	0	0	0	1	------	------	2	4	5	0	0	0
Colorado	10	13	4	3	6	------	29	9	20	0	0	1
New Mexico	0	2	1	2	------	------	21	1	4	0	0	0
Arizona	6	0	1	25	13	10	14	6	7	1	0	0
Utah [3]	0	0	0	------	------	------	37	18	23	0	0	0

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 20, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939	
PACIFIC												
Washington	1	1	1	-------	-------	-------	22	209	36	1	0	0
Oregon	0	4	2	-------	6	7	38	36	8	0	0	0
California	15	23	23	11	7	11	91	315	294	1	1	2
Total	114	213	301	220	318	238	3,308	2,154	2,801	33	27	50
29 weeks	8,194	10,879	13,097	167,533	150,548	140,981	220,675	344,403	344,403	1,025	1,259	3,860

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939	
NEW ENG.												
Maine	0	0	0	5	2	4	0	0	0	0	4	2
New Hampshire	0	0	0	3	1	1	0	0	0	0	0	1
Vermont	0	0	0	4	2	3	0	0	0	0	0	0
Massachusetts	1	1	3	29	31	53	0	0	0	1	2	2
Rhode Island	0	0	0	2	3	8	0	0	0	0	3	0
Connecticut	1	1	1	12	14	7	0	0	0	2	0	1
MID. ATL.												
New York	4	7	7	134	75	84	0	0	0	14	10	11
New Jersey	0	1	1	55	24	24	0	0	0	5	3	5
Pennsylvania	1	5	1	101	94	114	0	0	0	15	15	16
E. NO. CEN.												
Ohio	1·	2	2	80	40	40	0	4	1	3	9	9
Indiana [2]	1	0	1	30	26	22	2	4	4	7	11	9
Illinois [4]	1	6	2	100	63	102	1	4	10	15	11	18
Michigan [3]	8	17	4	61	76	82	0	3	1	3	6	6
Wisconsin	5	0	0	38	30	56	2	1	3	0	1	1
W. NO. CEN.												
Minnesota	0	1	0	17	19	20	7	0	4	0	1	1
Iowa	6	0	1	12	9	19	3	8	9	2	4	3
Missouri [2]	1	2	2	21	10	13	1	3	3	12	22	21
North Dakota	0	1	0	4	3	7	3	4	4	0	0	1
South Dakota [2]	0	0	0	5	17	8	3	3	3	0	1	0
Nebraska	2	1	1	3	3	4	0	2	2	0	0	0
Kansas	8	0	0	20	18	18	0	0	4	6	2	9
SO. ATL.												
Delaware [2]	0	0	0	0	2	1	0	0	0	1	1	1
Maryland [2 3 4]	1	0	0	9	10	10	0	0	0	3	6	11
Dist. of Col.	0	0	0	4	0	3	0	0	0	0	3	2
Virginia [2]	2	1	2	12	15	13	0	0	0	4	16	18
West Virginia [3]	4	2	0	18	13	11	0	0	0	3	12	12
North Carolina [4]	1	3	3	11	20	11	0	0	1	12	25	25
South Carolina [4]	0	12	1	2	0	2	0	0	0	15	30	23
Georgia [2 4]	1	5	2	8	13	5	0	0	0	24	20	43
Florida [4]	0	3	0	0	3	3	0	0	0	4	5	5

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 20, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939		July 20, 1940	July 22, 1939	
E. SO. CEN.												
Kentucky	4	1	2	18	10	12	0	0	0	11	30	39
Tennessee [3]	1	1	3	10	12	11	0	0	0	11	28	38
Alabama [4]	5	0	1	6	3	8	1	0	0	8	6	15
Mississippi [3]	1	1	3	5	0	6	0	0	0	6	9	14
W. SO. CEN.												
Arkansas	0	1	1	2	0	2	0	0	0	53	26	26
Louisiana [4]	7	1	3	1	6	4	0	0	0	28	43	25
Oklahoma	2	0	0	5	1	11	0	2	0	9	24	27
Texas [4]	8	7	2	17	15	23	0	1	1	43	52	52
MOUNTAIN												
Montana	4	0	0	6	11	5	0	0	4	0	0	1
Idaho	1	0	0	2	0	8	0	0	2	3	0	0
Wyoming [3]	0	0	0	1	0	8	0	2	1	0	2	1
Colorado	0	2	0	9	17	17	3	2	1	2	5	4
New Mexico	1	1	1	3	7	7	0	0	0	2	3	3
Arizona	0	0	0	4	4	3	1	1	0	5	2	2
Utah [3]	1	0	0	6	10	10	0	0	0	2	0	0
PACIFIC												
Washington	18	0	0	14	10	11	0	0	0	1	2	2
Oregon	2	0	0	13	4	10	1	2	2	4	2	3
California	15	51	21	38	68	73	1	0	1	6	7	7
Total	119	137	137	960	814	1,002	29	46	85	345	464	548
29 weeks	1,064	1,157	1,157	116,252	113,489	161,216	1,872	8,500	7,693	3,444	5,065	5,486

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 20, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough, Week ended July 20, 1940	Whooping cough, Week ended July 22, 1939	Division and State	Whooping cough, Week ended July 20, 1940	Whooping cough, Week ended July 22, 1939
NEW ENG.			SO. ATL.—continued		
Maine	32	6	South Carolina [4]	11	25
New Hampshire	0	5	Georgia [2, 4]	40	84
Vermont	8	30	Florida [4]	3	37
Massachusetts	132	124			
Rhode Island	5	15			
Connecticut	45	51	E. SO. CEN.		
MID. ATL.			Kentucky	83	46
			Tennessee [2]	48	60
New York	205	356	Alabama [4]	21	71
New Jersey	79	291	Mississippi [3]		
Pennsylvania	399	618			
E. NO. CEN.			W. SO. CEN.		
Ohio	387	103	Arkansas	47	15
Indiana [2]	30	189	Louisiana [4]	4	26
Illinois [4]	126	363	Oklahoma	19	2
Michigan [3]	235	269	Texas [4]	253	80
Wisconsin	83	262	MOUNTAIN		
W. NO. CEN.			Montana	3	6
			Idaho	3	3
Minnesota	34	22	Wyoming [2]	9	0
Iowa	27	33	Colorado	15	28
Missouri [2]	69	49	New Mexico	38	19
North Dakota	10	7	Arizona	13	17
South Dakota [2]	10	2	Utah [3]	87	48
Nebraska	7	37			
Kansas	53	15	PACIFIC		
SO. ATL.			Washington	45	22
			Oregon	19	23
Delaware [2]	12	3	California	276	133
Maryland [2, 3, 4]	163	57			
Dist. of Col	5	37	Total	3,426	4,061
Virginia [2]	36	107			
West Virginia [3]	51	26	29 weeks	93,427	113,405
North Carolina [4]	146	239			

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended July 20, 1940, 15 cases, as follows: Indiana, 2; Missouri, 1; South Dakota, 1; Delaware, 1; Maryland, 4; Virginia, 3; Georgia, 1; Tennessee, 1; Wyoming, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 20, 1940, 51 cases, as follows: Illinois, 1; Maryland, 1; North Carolina, 3; South Carolina, 1; Georgia, 17; Florida, 7; Alabama, 8; Louisiana, 1; Texas, 12.

VENEREAL DISEASES

New Cases Reported for May 1940 [1]

Reports from States

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis [2]					
	Primary and secondary	Early latent [3]	Rate per 10,000 population	Includes late-latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Alabama	231	338	1.94	406	1.39	65	.22	1,851	6.32	329	1.12	5	0.02
Alaska [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Arizona	22	8	.72	43	1.03	24	.57	97	2.32	37	.89	------	------
Arkansas	228	233	2.22	433	2.09	54	.26	1,171	5.64	229	1.10	12	.06
California	[5] 397	------	.63	1,505	2.41	92	.15	2,135	3.41	1,634	2.61	34	.05
Colorado	88	------	.82	169	1.57	22	.20	279	2.59	120	1.11	------	------
Connecticut	11	18	.14	92	.53	12	.07	164	.94	128	.73	------	------
Delaware	6	26	1.22	6	.23	------	------	157	5.97	39	1.48	------	------
Dist. of Columbia	------	------	------	------	------	------	------	680	10.69	268	4.21	4	.06
Florida	165	489	3.85	992	5.84	74	.44	1,834	10,79	143	.84	5	.03
Georgia	------	806	2.59	809	2.60	------	------	1,615	5.10	108	.35	8	.03
Hawaii	5	1	.15	24	.59	6	.15	48	1.19	57	1.41	------	------
Idaho	18	------	.36	[6] 17	.34	4	.08	44	.88	5	.10	------	------
Illinois	106	387	.62	1,425	1.80	107	.14	2,025	2.56	1,360	1.72	19	.02
Indiana	105	90	.56	270	.77	38	.11	724	2.07	147	.42	------	------
Iowa	36	41	.30	103	.40	9	.04	198	.77	129	.50	------	------
Kansas	48	36	.45	72	.39	11	.06	239	1.28	91	.49	1	.01
Kentucky	83	24	.36	311	1.05	16	.05	644	2.18	344	1.16	2	.01
Louisiana	362	2	1.70	------	------	3	.01	697	3.25	87	.41	7	.03
Maine [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Maryland	103	38	.84	210	1.25	18	.11	919	5.45	284	1.69	32	.19
Massachusetts	74	------	.17	417	.94	27	.06	518	1.17	313	.71	------	------
Michigan [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Minnesota	7	20	.10	182	.68	12	.04	222	.83	168	.63	------	------
Mississippi	302	830	5.45	749	3.67	100	.49	4,835	23.70	2,392	11.73	------	------
Missouri	170	370	1.34	270	.67	26	.06	878	2.18	159	.40	8	.02
Montana	16	------	.29	17	.31	------	------	36	.66	19	.35	------	------
Nebraska	38	4	.31	60	.44	7	.05	109	.80	66	.48	1	.01
Nevada	------	4	.39	13	1.27	1	.10	18	1.76	15	1.47	------	------
New Hampshire	------	------	------	10	.20	1	.02	22	.43	10	.20	------	------
New Jersey	90	140	.53	484	1.11	61	.14	826	1.89	229	.52	68	.16
New Mexico	33	10	1.02	110	2.61	23	.55	192	4.55	49	1.16	------	------
New York	352	332	.53	2,611	2.01	160	.12	3,744	2.88	1,445	1.11	31	.02
North Carolina	271	956	3.48	1,008	2.86	93	.26	2,328	6.59	458	1.30	34	.10
North Dakota	4	6	.14	5	.07	1	.01	25	.35	23	.32	------	------
Ohio	208	229	.65	892	1.32	96	.14	1,425	2.11	97	.14	------	------
Oklahoma	140	203	1.33	350	1.36	33	.13	952	3.70	238	.93	------	------
Oregon	36	38	.71	91	.88	6	.06	172	1.66	125	1.20	------	------
Pennsylvania [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Rhode Island	7	10	.25	96	1.41	3	.04	117	1.72	27	.40	------	------
South Carolina	645	448	5.78	686	3.63	29	.15	1,847	9.76	40	.21	1	.01
South Dakota	85	61	2.11	37	.53	9	.13	196	2.83	16	.23	------	------
Tennessee	223	382	2.07	591	2.02	61	.21	1,260	4.31	321	1.10	6	.02
Texas	329	485	1.31	798	1.28	92	.15	2,068	3.32	865	1.39	51	.08
Utah	13	10	.44	46	.88	5	.10	75	1.44	19	.36	------	------
Vermont	7	8	.26	4	.10	1	.03	15	.39	15	.39	------	------
Virginia	298	262	2.04	738	2.69	48	.17	1,467	5.35	219	.80	------	------
Washington	35	22	.34	101	.60	4	.02	192	1.15	193	1.15	------	------
West Virginia	265	111	1.98	139	.73	24	.13	800	4.20	258	1.36	4	.02
Wisconsin	8	26	.12	122	.41	5	.02	161	.55	67	.23	1	.003
Wyoming	11	3	.59	18	.76	4	.17	40	1.69	16	.68	2	.08
Puerto Rico [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Virgin Islands [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Total	5,681	7,497	1.16	17,515	1.54	1,487	.13	40,044	3.49	13,401	1.17	336	.04

See footnotes at end of table.

Reports from cities of 200,000 population or over

	Syphilis										Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis						
	Primary and secondary	Early latent	Rate per 10,000 population	Includes late-latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population		Number	Rate per 10,000 population	Number	Rate per 10,000 population
Akron	11	20	1.13	47	1.71	3	0.11	81	2.95		23	0.84	------	------
Atlanta	------	250	8.33	106	3.53	------	------	356	11.86		62	2.06	------	------
Baltimore	85	18	1.23	172	2.06	8	.10	574	6.87		187	2.24	30	0.36
Birmingham	89	40	4.38	61	2.07	20	.68	418	14.20		62	2.11	3	.10
Boston	29	------	.36	108	1.36	7	.09	178	2.24		101	1.27	------	------
Buffalo	12	2	.23	99	1.65	8	.13	121	2.01		48	.80	------	------
Chicago	79	198	.76	898	2.45	52	.14	1,227	3.35		947	2.58	19	.05
Cincinnati [4]	------	------	------	------	------	------	------	------	------		------	------	------	------
Cleveland	31	36	.71	181	1.92	14	.15	262	2.77		102	1.08	9	.10
Columbus	23	33	1.79	74	2.36	2	.06	132	4.21		15	.48	------	------
Dallas	48	49	3.19	156	5.13	2	.07	255	8.39		153	5.03	14	.46
Dayton	10	10	.90	46	2.07	2	.09	68	3.07		27	1.22	2	.09
Denver	------	------	------	------	------	------	------	104	3.45		69	2.29	------	------
Detroit	39	64	.57	232	1.28	12	.07	347	1.91		267	1.47	21	.12
Houston	27	63	2.51	103	2.87	10	.28	342	9.54		157	4.38	2	.06
Indianapolis	15	4	.49	17	.44	1	.03	134	3.48		31	.80	------	------
Jersey City	3	4	.22	17	.52	4	.12	32	.99		4	.12	------	------
Kansas City [4]	------	------	------	------	------	------	------	------	------		------	------	------	------
Los Angeles	------	129	.85	501	3.88	25	.16	745	4.90		449	2.95	------	------
Louisville	15	2	.50	100	2.95	3	.09	196	5.78		68	2.01	5	.15
Memphis [4]	------	------	------	------	------	------	------	------	------		------	------	------	------
Milwaukee	1	7	.13	62	.98	------	------	70	1.11		7	.11	------	------
Minneapolis	1	26	.54	44	.88	4	.08	75	1.50		48	.96	------	------
Newark	14	6	.44	179	3.94	7	.15	277	6.10		71	1.56	------	------
New Orleans [4]	------	------	------	------	------	------	------	------	------		------	------	------	------
New York	262	332	.79	1,748	2.33	91	.12	2,707	3.61		1,060	1.41	31	.04
Oakland	------	12	.38	70	2.24	8	.26	90	2.87		51	1.63	------	------
Omaha	5	------	.22	7	.31	1	.04	13	.58		13	.58	------	------
Philadelphia [4]	------	------	------	------	------	------	------	------	------		------	------	------	------
Pittsburgh	------	------	------	------	------	------	------	344	4.88		26	.37	------	------
Portland	9	18	.84	52	1.62	3	.09	82	2.56		53	1.65	------	------
Providence	5	4	.35	69	2.66	2	.08	80	3.08		20	.77	------	------
Rochester	1	1	.06	13	.38	1	.03	16	.47		31	.91	------	------
St. Louis	33	167	2.37	324	3.84	13	.15	537	6.37		147	1.74	9	.11
St. Paul	------	------	------	------	------	------	------	26	.90		22	.77	------	------
San Antonio [4]	------	------	------	------	------	------	------	------	------		------	------	------	------
San Francisco	47	------	.68	151	2.19	4	.06	202	2.93		211	3.06	6	.09
Seattle	13	20	.85	92	2.38	1	.03	129	3.33		140	3.62	3	.08
Syracuse	2	1	.13	61	2.71	5	.22	69	3.06		6	.27	------	------
Toledo	8	4	.30	45	1.45	1	.03	58	1.86		17	.55	------	------
Washington, D. C.	------	------	------	------	------	------	------	680	10.69		268	4.21	4	.06
Total	917	1,520	.93	5,925	2.25	314	.12	11,027	3.91		4,963	1.76	158	.08

[1] Figures preliminary and subject to correction.
[2] Includes "not stated" diagnosis.
[3] Duration of infection under 4 years.
[4] No report for current month.
[5] Includes early latent of less than 1 year's duration.
[6] Includes early latent, late, and late latent.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 6, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	106	29	14	1,840	322	589	9	363	52	1,296	-------
Current week [1]	28	21	9	2,015	197	472	0	292	42	871	-------
Maine:											
Portland	0	------	0	15	1	0	0	2	1	4	26
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	12
Manchester	0	------	0	0	0	0	0	0	0	0	16
Nashua	0	------	0	0	0	0	0	0	0	0	5
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	9
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	0	------	0	118	5	21	0	6	1	29	199
Fall River	0	------	0	78	1	0	0	0	0	10	26
Springfield	0	------	0	12	0	6	0	0	0	1	33
Worcester	0	------	0	174	3	0	0	3	0	3	42
Rhode Island:											
Pawtucket	0	------	0	0	0	1	0	0	0	0	13
Providence	0	------	0	48	2	2	0	1	0	8	44
Connecticut:											
Bridgeport	0	------	0	2	0	1	0	0	0	0	19
Hartford	0	------	0	0	0	2	0	1	0	0	34
New Haven	0	------	0	1	1	2	0	2	0	2	32
New York:											
Buffalo	0	------	0	3	3	15	0	4	0	6	130
New York	9	4	0	298	31	92	0	65	3	98	1,257
Rochester	0	------	0	3	2	0	0	1	0	3	68
Syracuse	0	------	0	1	0	2	0	1	0	4	41
New Jersey:											
Camden	0	------	0	2	2	5	0	1	0	0	32
Newark	0	1	0	185	0	8	0	5	0	18	86
Trenton	0	------	0	0	0	4	0	2	0	0	31
Pennsylvania:											
Philadelphia	1	1	2	150	10	28	0	17	7	23	380
Pittsburgh	0	------	1	2	9	2	0	5	0	13	137
Reading	0	------	0	2	0	0	0	1	0	21	16
Scranton	0	------	------	1	------	0	0	------	0	1	------
Ohio:											
Cincinnati	1	------	0	4	2	5	0	2	1	13	93
Cleveland	------	------	------	------	------	------	------	------	------	------	------
Columbus	0	------	0	1	0	3	0	1	0	3	56
Toledo	0	------	0	2	4	6	0	2	0	16	57
Indiana:											
Anderson	2	------	0	0	0	0	0	0	0	0	3
Fort Wayne	0	------	0	2	1	0	0	0	0	0	22
Indianapolis	0	------	0	2	4	0	0	4	0	5	90
Muncie	0	------	0	0	2	0	0	0	0	1	11
South Bend	0	------	0	0	1	0	0	0	0	0	8
Terre Haute	0	------	0	0	0	2	0	0	0	1	22
Illinois:											
Alton	0	------	0	0	0	0	0	1	0	0	8
Chicago	5	1	2	169	11	115	0	23	0	38	555
Elgin	0	------	0	1	1	0	0	0	0	0	22
Moline	0	------	0	5	0	0	0	0	0	0	6
Springfield	0	------	0	0	1	1	0	0	0	3	28
Michigan:											
Detroit	1	------	0	239	18	33	0	19	1	83	226
Flint	0	------	0	1	1	3	0	1	1	1	24
Grand Rapids	0	------	0	6	0	5	0	0	0	17	29
Wisconsin:											
Kenosha	0	------	0	15	0	0	0	0	0	0	5
Madison	0	------	0	29	0	0	0	0	0	3	7
Milwaukee	0	------	0	253	4	8	0	3	0	9	103
Racine	0	------	0	6	0	3	0	0	0	1	16
Superior	0	------	0	12	0	0	0	0	0	0	4

[1] Figures for Barre, Cleveland, and Shreveport estimated; reports not received.

City reports for week ended July 6, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	4	0	1	0	1	0	0	22
Minneapolis	0	------	0	0	4	8	0	1	0	4	70
St. Paul	0	------	0	0	2	9	0	2	0	14	60
Iowa:											
Cedar Rapids	0	------	------	1	------	0	0	------	0	0	------
Davenport	0	------	------	1	------	0	0	------	0	0	------
Des Moines	0	------	0	8	0	1	3	0	0	3	42
Sioux City	0	------	------	0	------	1	0	------	0	2	------
Waterloo	0	------	------	1	------	0	0	------	0	3	------
Missouri:											
Kansas City	0	------	0	4	4	2	0	2	1	1	82
St. Joseph	0	------	0	0	1	0	0	0	0	1	25
St. Louis	0	------	0	1	5	7	0	6	1	14	173
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	0	0	2
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	------	0	------	0	0	------	0	0	------
South Dakota:											
Aberdeen	0	------	------	1	------	0	0	------	0	3	------
Sioux Falls	0	------	0	0	0	1	0	0	0	0	7
Nebraska:											
Lincoln	0	------	------	0	------	0	0	------	0	1	------
Omaha	0	------	0	3	2	1	0	2	0	3	38
Kansas:											
Lawrence	0	------	1	0	0	0	0	0	0	0	4
Topeka	0	------	0	12	6	1	0	0	0	0	17
Wichita	0	------	0	3	2	0	0	0	0	3	19
Delaware:											
Wilmington	0	------	0	0	0	0	0	1	2	1	28
Maryland:											
Baltimore	0	1	1	1	4	6	0	10	0	111	174
Cumberland	0	------	0	0	0	0	0	0	0	0	5
Frederick	0	------	0	0	1	0	0	0	0	0	------
Dist. of Col.:											
Washington	1	------	0	2	1	11	0	7	0	3	123
Virginia:											
Lynchburg	0	------	0	0	0	0	0	0	0	5	6
Norfolk	0	------	0	10	1	0	0	1	2	1	15
Richmond	0	------	1	0	1	2	0	3	2	0	47
Roanoke	0	------	0	13	0	0	0	0	0	7	10
West Virginia:											
Charleston	0	------	0	0	2	0	0	1	2	0	38
Huntington	0	------	------	0	------	2	0	------	0	0	------
Wheeling	0	------	0	0	0	0	0	0	1	1	18
North Carolina:											
Gastonia	0	------	------	0	------	1	0	------	0	0	------
Raleigh	0	------	0	0	0	0	0	0	0	3	15
Wilmington	0	------	0	0	1	0	0	0	0	0	13
Winston-Salem	0	------	0	0	1	0	0	2	0	0	21
South Carolina:											
Charleston	0	2	0	0	4	0	0	1	0	0	24
Florence	0	------	0	0	0	0	0	0	0	0	9
Greenville	0	------	0	0	3	0	0	0	0	0	23
Georgia:											
Atlanta	0	------	0	7	1	1	0	6	0	10	64
Brunswick	0	------	0	0	0	0	0	0	0	0	2
Savannah	0	1	------	0	0	0	0	1	0	0	25
Florida:											
Miami	0	------	0	0	1	0	0	1	0	0	35
Tampa	0	------	0	4	0	0	0	1	1	2	26
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	0	0	10
Covington	0	------	0	0	1	0	0	0	0	0	------
Lexington	0	------	0	21	1	0	0	1	0	7	14
Louisville	0	------	0	5	1	2	0	2	0	29	50
Tennessee:											
Knoxville	0	1	0	0	3	2	0	2	0	0	32
Memphis	0	------	0	5	1	0	0	3	0	12	50
Nashville	0	------	0	2	0	0	0	0	0	4	39
Alabama:											
Birmingham	0	------	0	1	1	3	0	5	1	5	67
Mobile	0	------	0	40	0	2	0	2	0	0	20
Montgomery	0	------	------	0	------	3	0	------	0	8	------

City reports for week ended July 6, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Arkansas:											
Fort Smith	0			0		0	0		0	2	
Little Rock	0		0	0	4	0	0	2	0	4	
Louisiana:											
New Orleans	1		0	1	10	2	0	6	6	3	135
Shreveport											
Oklahoma:											
Oklahoma City	0		0	0	2	3	0	0	0	1	46
Tulsa	0		0	0	2	0	0	0	0	9	12
Texas.											
Dallas	2		0	15	1	0	0	2	2	17	75
Fort Worth	0		0	19	1	1	0	1	0	18	37
Galveston	0		0	0	1	0	0	1	0	0	11
Houston	0		0	7	7	1	0	5	3	10	69
San Antonio	0		0	0	0	0	0	12	8	7	72
Montana:											
Billings	0		0	0	1	2	0	0	0	0	8
Great Falls	0		0	2	1	0	0	0	0	0	6
Helena	0		0	0	0	1	0	0	0	0	1
Missoula	0		0	0	0	0	0	0	0	1	4
Idaho:											
Boise	0		0	1	0	0	0	0	0	2	6
Colorado:											
Colorado Springs	0		0	0	1	1	0	0	0	0	10
Denver	3		0	5	1	0	0	2	0	0	74
Pueblo	0		0	0	0	0	0	0	0	0	5
New Mexico:											
Albuquerque	0		0	0	0	0	0	0	0	3	7
Utah:											
Salt Lake City	0		0	46	0	2	0	0	0	60	33
Washington:											
Seattle	1		0	18	2	4	0	2	0	15	63
Spokane	0		0	2	1	2	0	0	1	3	31
Tacoma	0		0	0	0	0	0	0	0	0	27
Oregon:											
Portland	0		0	6	0	1	0	2	0	7	74
Salem	0			1		0	0		0	2	
California:											
Los Angeles	1	3	1	5	3	6	0	11	0	59	255
Sacramento	2		0	0	2	1	0	3	0	7	25
San Francisco	0	1	0	0	0	6	0	10	0	17	142

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Rhode Island:			
Providence	0	0	1
New York:			
New York	0	0	2
Pennsylvania:			
Philadelphia	0	0	1
Pittsburgh	1	1	0
Ohio:			
Cincinnati	1	0	1
Illinois:			
Chicago	1	0	0
Minnesota:			
St. Paul	0	0	1
Nebraska:			
Omaha	0	0	1
Virginia:			
Norfolk	0	0	1
West Virginia:			
Huntington	0	0	1
South Carolina:			
Greenville	0	1	0
Oklahoma:			
Oklahoma City	0	0	1
Texas:			
Houston	0	0	2
Washington:			
Seattle	0	0	4
Tacoma	0	0	2
California:			
Los Angeles	0	0	5

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Chicago, 1; Billings, 1; Missoula, 1.
Pellagra.—Cases: Savannah, 1; Birmingham, 1; Los Angeles, 1.
Typhus fever.—Cases: Wilmington, N. C., 1; Charleston, S. C., 1; Savannah, 1; Miami, 1; New Orleans, 1. Deaths: Wheeling, 1; Miami, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 15, 1940.—During the week ended June 15, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	1				1	3
Chickenpox		3	14	79	463	62	110	2	52	785
Diphtheria				26	1	2		2		31
Dysentery				11						11
Influenza					10				6	16
Lethargic encephalitis					1					1
Measles	1	17	2	72	131	103	150	3	71	559
Mumps			1	17	212	6	14		6	256
Pneumonia	1	5			11		1		1	19
Poliomyelitis				3		1				4
Scarlet fever		2	6	73	110	8	5	10	6	220
Tuberculosis	1	3	10	95	44	4	2	4		163
Typhoid and paratyphoid fever			2	15	6			2		25
Whooping cough		1	1	204	132	45	41	9	55	488

EGYPT

Infectious diseases—Fourth quarter 1939.—During the fourth quarter of 1939, the following numbers of cases of infectious diseases and deaths from the same causes were reported in Egypt:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	4	2	Mumps	333	5
Cerebrospinal meningitis	45	25	Poliomyelitis	1	1
Chickenpox	102	2	Puerperal septicemia	108	65
Diphtheria	821	377	Rabies	10	9
Dysentery	665	108	Scarlet fever	22	
Erysipelas	871	98	Tetanus	127	67
Influenza	1,849	27	Tuberculosis (all forms)	1,460	771
Leprosy	115	18	Typhoid fever	1,188	249
Lethargic encephalitis		2	Typhus fever	128	26
Malaria	6,672	31	Undulant fever	7	1
Measles	1,471	275	Whooping cough	494	13

Vital statistics—Fourth quarter 1939.—Following are vital statistics for the fourth quarter of 1939 for all places in Egypt having a health bureau:

Number of live births	64,887	Deaths per 1,000 population	26.8
Live births per 1,000 population	51.9	Deaths under 2 years of age	9,200
Number of stillbirths	1,172	Deaths under 2 years of age per 1,000 live births	142
Total deaths	33,544		

SWITZERLAND

Communicable diseases—April 1940.—During the month of April 1940, cases of certain communicable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	103	Poliomyelitis	8
Chickenpox	75	Scarlet fever	369
Diphtheria and croup	51	Trachoma	1
German measles	197	Tuberculosis	319
Influenza	199	Typhoid fever	5
Measles	1,316	Undulant fever	10
Mumps	93	Whooping cough	176
Paratyphoid fever	7		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Officer of Public Health, Pan American Sanitary Bureau, health section of the League of Nations and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-April, 1940	May 1940	June 1940—week ended—				
				1	8	15	22	29
ASIA								
China: Shanghai	C			[1] 2			1	
India	C	16,534						
Bassein	C	12	130	5				
Calcutta	C	808	807	67	65		95	
Cawnpore	C	10	1	1	1			
Chittagong	C		4					
Madras	C	1						
Moulmein	C			10			1	
Porto Novo	C	1						
Rangoon	C	31	5					
India (French)	C	34						
Indochina (French)	C	436						
Thailand	C	235						

[1] Imported.

PLAGUE

Place		January-April, 1940	May 1940	June 1940—week ended—				
				1	8	15	22	29
AFRICA								
Belgian Congo	C	3	9					
British East Africa:								
Kenya	C	6						
Uganda	C	72	6					
Egypt	C	355	[1] 51	1				
Madagascar	C	472						
Morocco.[2]								
Rhodesia, Northern	C	1						
Senegal:								
Dakar	D	[3] 1						
Thies	C		1					
Union of South Africa	C	12						

[1] Includes 5 cases of pneumonic plague.
[2] A report dated May 11, 1940, stated that there was an epidemic of bubonic plague in southern Morocco, where several hundred cases had been unofficially reported.
[3] Imported.

PLAGUE—Continued

[C indicates cases; D, deaths]

Place		January-April, 1940	May 1940	June 1940—week ended— 1	8	15	22	29
ASIA								
China.[4]								
Dutch East Indies: Java and Madura	C	187						
India	C	12,090						
Bassein	C	16	1					
Cochin	C	1						
Plague-infected rats		3						
Rangoon	C	4					1	
Indochina (French)	C	8						
Thailand:								
Bangkok	C	8						
Bisnulok Province	C	3						
Dhonpuri Province	C	1						
Jayanad Province	C	3						
Kamphaeng Bajr Province	C	29						
Kanchanapuri Province	C	12						
Koan Kaen Province	C	5						
Nagara Svarga Province	C	30						
Noangkhay Province	C	4						
Sukhodaya Province	C	22						
EUROPE								
Portugal: Azores Islands	C	2						
NORTH AMERICA								
United States. (See issue of July 19, p. 1321.)								
SOUTH AMERICA								
Argentina:								
Salta Province	C	2						
Santiago del Estero Province	C	6						
Tucuman Province	C	3						
Brazil:								
Alagoas State	C	5						
Pernambuco State	C	1						
Peru:								
Cajamarca Department	C	9						
Lambayeque Department	C	8						
Libertad Department	C	42						
Lima Department	C	24						
Piura Department	C	6						
OCEANIA								
Hawaii Territory: Plague-infected rats		12	1		1		2	1

[4] Information dated July 7 states that up to July 6, 17 cases of plague had been reported near Tungliao, Hsingan Province, China.

SMALLPOX

AFRICA								
Algeria	C	1						
Angola	C	35						
Belgian Congo	C	1,356	353					
British East Africa	C	12						
Dahomey	C	17						
French Guinea	C	13						
Gibraltar	C	[1] 1						
Ivory Coast	C	110	3					
Nigeria	C	1,481	187					
Niger Territory	C	359	235					
Nyasaland	C	34	12					
Portuguese East Africa	C	1						
Rhodesia, Southern	C	147	36					
Senegal	C	103	28					
Sierra Leone	C	10						
Sudan (Anglo-Egyptian)	C	288	95	5	17			
Sudan (French)	C		1					
Union of South Africa	C	46						

[1] Imported.

SMALLPOX—Continued

[C indicates cases; D, deaths]

Place		January-April, 1940	May 1940	June 1940—week ended— 1	8	15	22	29
ASIA								
Arabia	C	255						
China	C	512	111	28	4		11	
Chosen	C	533						
Dutch East Indies—Sabang	C	4						
India	C	90,394						
India (French)	C	5						
India (Portuguese)	C	24						
Indochina (French)	C	805						
Iran	C	148	3					
Iraq	C	113	22	12				
Japan	C	458	[2] 41					
Straits Settlements	C	1						
Sumatra	C	1						
Thailand	C	5	7					
EUROPE								
Great Britain	C	2						
Greece	C	19						
Portugal	C	101	9	1	4	5	1	
Spain	C	280	34	1				
Turkey	C	139						
NORTH AMERICA								
Guatemala	C	1						
Mexico	C	40	4					
SOUTH AMERICA								
Bolivia	C	24						
Brazil	C	1						
Colombia	C	970		2				
Ecuador	C		1					
Venezuela (alastrim)	C	101	27					

[2] For the period May 3 to June 4.

TYPHUS FEVER

Place		January-April, 1940	May 1940	June 1940—week ended— 1	8	15	22	29
AFRICA								
Algeria	C	952	557					
Belgian Congo	C	1,210						
British East Africa	C	2						
Egypt	C	2,521	506	101				
Eritrea	C	40						
Morocco	C	216	58					
Tunisia	C	247	208					
Union of South Africa	C	103	2	1				
ASIA								
China	C	773	505					
Chosen	C	5						
India	C	3						
Indochina (French)	C	2						
Iran	C	233						
Iraq	C	72	14	2				
Japan	C	2						
Palestine	C	34	9	1	6			
Straits Settlements	C		1					
Trans-Jordan	C	13	2					
EUROPE								
Bulgaria	C	57	28	9				
Germany	C	82	17					
Greece	C	14	10					
Hungary	C	52	17	3				
Irish Free State	C			1	1		1	
Lithuania	C	31						
Rumania	C	977	115	33	12	27		
Spain	C	3	6	2				
Turkey	C	503						
Yugoslavia	C	221	9					

TYPHUS FEVER—Continued

[C indicates cases; D, deaths]

Place		January-April, 1940	May 1940	June 1940—week ended— 1	8	15	22	29
NORTH AMERICA								
Guatemala	C	179	32					
Mexico	C	159	2					
Panama Canal Zone	C	3						
SOUTH AMERICA								
Bolivia	C	165						
Chile	C	54	1					
Ecuador	C	2						
Venezuela	C	4	4					
OCEANIA								
Australia	C	9	1					
Hawaii Territory	C	12	1	1				2

YELLOW FEVER

Place		January-April, 1940	May 1940	June 1940—week ended— 1	8	15	22	29
AFRICA								
Cameroon: Nkongsamba	C	[1] 1						
French Equatorial Africa: Fort Archambault	C	[1] 1						
Gold Coast	C	1						
Ivory Coast	C	1						
Nigeria:								
Ibadan	C					1		
Oshogbo	C		[1] 1					
SOUTH AMERICA								
Brazil:								
Espirito Santo State	D	[2] 28						
Rio de Janeiro State	D	[2] 1						
Colombia:								
Antioquia Department—San Luis	D	2						
Caldas Department—								
La Pradera	D	1						
Samana	D	1						
Victoria	D	1						

[1] Suspected.
[2] Jungle type.

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Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service, through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

June 16–July 13, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section Prevalence of Disease. The table gives the number of cases of these diseases for the 4-week period ended July 13, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

With the exception of influenza, the incidence during the 4 weeks ended July 13 of all of the eight communicable diseases under consideration was again below the median expectancy for the period.

Influenza.—The number of cases (1,452) of influenza reported for the 4 weeks ended July 13 was about 90 percent of the number reported for the corresponding period in 1939, but it was slightly above the average incidence for this period. The increase seemed to be largely due to a somewhat higher incidence in the East North Central, South Atlantic, and Pacific regions than might normally be expected at this season of the year.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended July 13 there were 623 cases of diphtheria reported, as compared with 986, 1,145, and 1,249 cases for the corresponding period in 1939, 1938, and 1937, respectively. The current incidence was about 63 percent of the incidence last year and about 50 percent of the 1935–39 median figure for this period. The Mountain region reported a 40 percent excess over the expected seasonal incidence in that region, but in all other regions the number of cases was relatively low.

Measles.—The number of reported cases (23,946) of measles for the current period was almost 20 percent above the number recorded for the corresponding period in 1939, but it was about 5 percent below the average incidence for recent years. Very significant decreases from the 1935–39 median figures were reported from the Middle

Atlantic, East North Central, South Atlantic, and Pacific regions, but in all other regions the incidence was comparatively high.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period June 16–July 13, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	623	986	1,232	1,452	1,599	1,384	23,946	20,185	24,029	89	124	296
New England	11	23	82	8	7	5	5,202	3,929	3,786	1	5	7
Middle Atlantic	103	137	241	30	18	22	6,666	4,126	10,052	15	34	72
East North Central	114	176	299	160	136	136	5,810	2,029	7,655	15	20	33
West North Central	45	63	85	19	108	118	1,168	950	950	6	12	16
South Atlantic	80	164	180	546	695	237	967	1,741	1,694	15	27	53
East South Central	45	63	82	73	117	109	720	273	436	14	12	38
West South Central	82	196	155	373	299	380	1,035	1,078	546	13	6	18
Mountain	66	66	47	99	130	71	1,137	758	740	2	2	4
Pacific	77	98	98	144	89	95	1,241	5,301	3,515	8	6	21
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	301	390	390	5,703	4,732	8,017	158	381	534	857	1,369	1,706
New England	5	5	9	435	426	652	0	6	0	22	33	24
Middle Atlantic	4	18	18	1,858	1,247	2,381	0	0	0	89	73	115
East North Central	35	32	24	1,984	1,601	2,932	36	104	104	78	100	137
West North Central	30	12	12	366	381	751	71	127	220	58	56	76
South Atlantic	24	148	58	266	230	330	3	6	6	188	415	479
East South Central	16	19	41	181	153	135	11	11	5	98	238	334
West South Central	31	43	23	129	124	155	21	33	22	256	318	348
Mountain	9	20	4	128	181	225	10	34	81	26	54	56
Pacific	147	93	44	356	389	473	6	60	70	42	52	53

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

Meningococcus meningitis.—The incidence of meningococcus meningitis reached a new low level. For the current period there were 89 cases reported, as compared with 124 for the corresponding period in 1939 and a median of 296 cases for the years 1935–39. Each section of the country shared in the favorable situation of this disease that now exists.

Poliomyelitis.—Of a total of 301 cases of poliomyelitis reported for the 4 weeks ended July 13, California reported 92, Washington 53, Texas 14, and Iowa, Kansas, Michigan, and Oklahoma 11 cases each; about 70 percent of the cases occurred in those 7 States. No more than 7 cases were reported from any other State and the figures represent about the normal increase in this disease that is expected at this season of the year. For the country as a whole the current incidence is approximately 75 percent of last year's figure for this period, which figure (390 cases) also represents the 1935–39 median incidence for this period.

Scarlet fever.—The scarlet fever incidence (5,703 cases) was about 20 percent above the recorded incidence for the corresponding period in 1939, but it was only about 70 percent of the average incidence for recent years. The East South Central region reported a slight increase over the 1935–39 median incidence, but other regions reported very definite declines from the seasonal expectancy.

Smallpox.—The smallpox incidence also reached a new low level, the current incidence (158 cases) being the lowest on record for this period. In the East South Central region the number of cases was slightly higher than might be expected and in the West South Central region the incidence stood approximately at the normal seasonal level, but other regions reported a significantly low incidence.

Typhoid fever.—The recent favorable record for typhoid fever was maintained during the current period. The number of reported cases (857) was only about 62 percent of the number reported in 1939 and approximately 50 percent of the 1935–39 average incidence for this period. The situation was favorable in all sections of the country.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended July 13, based on data received from the Bureau of the Census, was 10.2 per 1,000 inhabitants (annual basis). The rate for this period in 1939 was 10.1 and the average rate in the years 1935–39 was 10.6.

DISEASE OUTBREAKS RESULTING FROM FAULTY ENVIRONMENTAL SANITATION

By LESLIE C. FRANK, *Senior Sanitary Engineer, United States Public Health Service*

INTRODUCTION

Heretofore we have not been well informed as to the total number of outbreaks of disease which result from faulty sanitation. Several causes are responsible:

(*a*) The reporting of cases of communicable disease is frequently incomplete.

(*b*) The epidemiological studies of cases which *are* reported are frequently inadequate.

(*c*) The outbreaks which *are* studied are not always reported.

(*d*) The outbreaks which *are* reported have not hitherto been systematically corrected and published by any central national agency.

Not until 1923 did the United States Public Health Service inaugurate annual surveys of milk-borne outbreaks of disease. Prior to that time the approximate number of milk-borne outbreaks which

had found their way into the miscellaneous literature was 17 per year. As a result of the increased emphasis placed by the Public Health Service in 1923 upon more complete reporting of milk-borne outbreaks, the annual number of known outbreaks rose from 17 to about 42.

Last year the Public Health Service inaugurated the first Nati -wide survey of outbreaks of disease caused by faulty sanitation in general. Following is a discussion of the reports received for the year 1938, together with a discussion of the outbreak history prior to that year.

TOTAL DISEASE OUTBREAKS—ALL VEHICLES

TABLE 1.—*Total outbreaks, cases and deaths, 1938, by vehicles*

Vehicle	Number of outbreaks	Number of cases	Number of deaths
Water supplies	48	31, 693	17
Milk and milk products	42	1, 685	27
Other foods	70	2, 247	25
Unidentified vehicles	8	882	3
Total	168	36, 507	72

Of interest in table 1 is the finding that foods were a more prolific source of outbreaks in 1938 than were milk or water supplies. However, the number of persons affected by water-borne disease was far greater than the number affected by milk or food-borne disease. This was the result of a single water-borne outbreak of gastroenteritis, involving 29,250 cases, which occurred in one large city.

WATER-BORNE OUTBREAKS

TABLE 2.—*Water-borne outbreaks, 1938, by kind of supply*

Kind of water supply	Number of outbreaks	Number of cases	Number of deaths
Ground water supplies, treated	5	177	0
Ground water supplies, untreated	35	926	16
Surface water supplies, treated	4	30, 374	0
Surface water supplies, untreated	4	40	1

Of interest is the fact that the greatest number of water-borne outbreaks and deaths occurred in connection with untreated ground water supplies. This means that one of the important problems still remaining in connection with the prevention of water-borne outbreaks is a more intensive sanitary control of ground water supplies. Many ground water supplies are faulty either in design or operation or both.

It is also evident, however, that our control of surface water supplies is not adequate either, for during 1938, as table 2 shows, there were

reported a total of 8 outbreaks in connection with surface water supplies, 4 of which were treated water supplies.

TABLE 3.—*Water-borne outbreaks, 1938, by diseases*

Disease	Number of outbreaks	Number of cases	Number of deaths
Dysentery	8	1,379	0
Gastroenteritis	22	30,108	0
Typhoid fever	18	206	17
Total	48	31,693	17

Table 3 shows that defective water supplies caused more outbreaks of gastroenteritis (22) than of either typhoid fever or dysentery. It is further to be noted that unsafe water supplies caused as many typhoid fever outbreaks as did unsafe milk supplies (see table 8).

TABLE 4.—*Water-borne outbreaks, 1938, by location*

State	Number of outbreaks	Number of cases	Number of deaths
Alabama	1	4	0
California	1	5	1
Connecticut	1	123	0
Indiana	5	451	6
Maine	1	2	0
Maryland	1	663	0
Massachusetts	2	68	0
New York	24	894	3
North Carolina	1	8	0
Ohio	1	3	0
South Carolina	1	23	3
Texas	4	31	2
Virginia	2	141	1
West Virginia	2	27	1
Wisconsin	1	29,250	0
Total (15 States)	48	31,693	17

It will be noted that 33 States failed to report any water-borne outbreaks whatever, whereas New York State reported 24, or exactly one-half of the total of 48 outbreaks.

TABLE 5.—*Water-borne outbreaks, 1938, by size of community*

Size of community	Outbreaks		Cases	
	Number	Percent	Number	Percent
1-99	11	23	178	0.6
100-199	4	8	205	.6
200-499	3	6	167	.5
500-999	9	19	498	1.6
1,000-2,499	6	13	711	2.2
2,500-4,999	8	17	193	.6
5,000-9,999	5	10	401	1.3
10,000-24,999	1	2	90	.3
25,000-49,999				
50,000-99,999				
100,000-499,999				
500,000 and over	1	2	29,250	92.3
Total	48	100	31,693	100.0

It will be noted that only 2 of the 48 water-borne outbreaks (4 percent) occurred in communities of more than 10,000 population. Since these constitute about 47.2 percent of the total population it is probably safe to say that water supplies in small communities are in general much less safe than water supplies in large communities. In other words many more water-borne outbreaks occur per unit of population in small communities than in large ones.

On the other hand, *so far as known numbers of persons affected* is concerned, the most extensive water-borne outbreak during 1938 occurred in one large city, in which 29,250 persons were involved. This should be compared with the fact that only 31,693 cases were reported for communities of all sizes.

PREVIOUS KNOWN INCIDENCE OF WATER-BORNE OUTBREAKS

Table 6 gives the frequency of water-borne outbreaks in the United States for the period 1920–36, inclusive, by years, as reported by Wolman and Gorman (*1*) for 1920 to 1929, inclusive, and by Wolman (*2*) for 1930 to 1936, inclusive.

TABLE 6.—*Water-borne outbreaks in the United States 1920–36, inclusive*

Year	Number of outbreaks	Number of cases	Number of deaths
1920	26	10,115	133
1921	29	3,419	30
1922	20	1,363	60
1923	24	1,488	119
1924	23	11,650	70
1925	24	6,073	16
1926	21	45,992	42
1927	30	1,694	51
1928	19	3,385	33
1929	26	8,503	76
1930	25	6,908	33
1931	20	1,184	15
1932	13	756	12
1933	20	2,371	131
1934	31	5,015	38
1935	29	1,908	43
1936	32	3,953	53
Total, 1920–36	412	115,807	955
Average per year	24.2	6,812	56
1938	48	31,693	17

It will be noted that the average number of water-borne outbreaks for the period 1920–36 was 24.2 per year, whereas the number of outbreaks reported for 1938 was 48; that the average annual number of cases of water-borne disease for the period was 6,812 as compared with 31,693 for 1938; and that the average annual number of deaths from water-borne disease for the period was 56 as compared with 17 for the year 1938. In only 1 year, 1926, was the reported number of cases of water-borne disease greater than the number reported for 1938. On the other hand, the deaths reported for 1938 were fewer in number than those reported for any of the 17 years except 3.

OUTBREAKS TRANSMITTED THROUGH MILK AND MILK PRODUCTS

TABLE 7.—*Outbreaks transmitted through milk and milk products, 1938, by kind of supply*

Kind of supply	Number of outbreaks	Number of cases	Number of deaths
Sweet milk, raw	37	1,462	27
Sweet milk, pasteurized	1	100	0
Buttermilk, raw	1	10	0
Buttermilk, pasteurized	0	0	0
Ice cream	2	96	0
Cheese	1	17	0
Total	42	1,685	27

It will be noted from table 7 that 38 of the 42 milk-borne outbreaks occurred in connection with sweet milk supplies, that only 1 was traced to buttermilk, only 2 to ice cream, and only 1 to cheese. In only 1 of the 38 outbreaks traced to sweet milk was any attempt made to pasteurize the milk. In this case the pasteurizer was reported to have "broken down."

TABLE 8.—*Outbreaks transmitted through milk and milk products, 1938, by diseases*

Disease	Number of outbreaks	Number of cases	Number of deaths
Diphtheria	1	31	3
Dysentery	2	166	0
Food poisoning	1	17	0
Gastroenteritis	8	610	0
Scarlet fever	5	82	0
Septic sore throat	7	592	7
Typhoid fever	18	187	17
Total	42	1,685	27

Evidently, typhoid fever was involved more often than any other disease, and caused more deaths. On the other hand, gastroenteritis and septic sore throat were the most prolific sources of cases, namely, 610 and 592, respectively, or 1,202 of the total of 1,685 cases of all diseases.

Table 9 shows that 31 States failed to report any milk-borne outbreaks whatever, whereas New York State reported more milk-borne outbreaks than did any other State, namely, 10 of the total of 42. California and Minnesota reported 5 each. Therefore, 3 of the 48 States reported nearly half of the outbreaks. Of course, this does not necessarily mean that these 3 States actually experienced so large a percentage of the total number of milk-borne outbreaks. It may mean, and probably does, that the outbreaks were more completely reported by these States.

TABLE 9.—*Outbreaks transmitted through milk and milk products, 1938, by location*

State	Number of outbreaks	Number of cases	Number of deaths
California	5	245	3
Colorado	2	83	3
Georgia	1	6	0
Idaho	2	38	1
Illinois	2	78	0
Indiana	2	15	0
Iowa	1	107	0
Kansas	1	5	1
Kentucky	1	10	0
Michigan	1	49	6
Minnesota	5	83	2
New York	10	859	7
North Dakota	2	11	2
Oklahoma	2	19	0
Washington	1	12	2
West Virginia	1	10	0
Wisconsin	3	55	0
Total (17 States)	42	1,685	27

TABLE 10.—*Outbreaks transmitted through milk and milk products, 1938, by size of community*

Size of community	Outbreaks		Cases	
	Number	Percent	Number	Percent
1–99	1	2	4	0.2
100–199	3	7	181	10.7
200–499	11	27	457	27.1
500–999	6	14	207	12.3
1,000–2,499	8	20	551	32.7
2,500–4,999	5	12	165	9.8
5,000–9,999	3	7	23	1.4
10,000–24,999	3	7	36	2.1
25,000–49,999	1	2	49	3.0
50,000–99,999				
100,000–499,999	1	2	12	.7
500,000 and over				
Total	42	100	1,685	100.0

Here again, as in the case of water-borne outbreaks, only 5 of the 42 outbreaks (12 percent) occurred in communities of more than 10,000 population. Since about 47.2 percent of the population lives in communities of more than 10,000 population it is hardly probable that by chance alone only 12 percent of the milk-borne outbreaks would have occurred therein. A far more logical explanation would be the probability that milk supplies in small communities in general are not as safe as those in large communities. For one thing, the percentage of milk pasteurized in communities of from 1,000 to 10,000 population is considerably smaller than for cities of over 10,000 population. For 1936 these figures were 39.3 percent for the group with 1,000 to 10,000 population as compared with 83.1 percent for the group with 10,000 and over population (*3*).

PREVIOUS KNOWN INCIDENCE OF OUTBREAKS TRACED TO MILK AND MILK PRODUCTS

In 1927 Armstrong and Parran (*4*) listed 791 outbreaks of milk-borne disease in the United States as having been reported in the literature from January 1, 1881, to January 1, 1927. This represents approximately 17 outbreaks per year for the 46-year period. However, the actual number of outbreaks of disease in this country traced to milk and milk products has been and is much greater than this, since the above figures do not include any outbreaks which failed to find their way into the literature.

Believing that a frequent periodic questionnaire survey, addressed to health authorities, might give a nearer approximation of the true number of outbreaks, in 1923 the Public Health Service instituted annual surveys as part of the work of its Office of Milk Investigations.

The total number of outbreaks reported by health authorities in the United States from 1923–1937, inclusive, was 639, or 42.6 per year instead of 17 per year as reported in the literature for the period 1881–1927. This, of course, does not mean that the incidence of milk-borne outbreaks was greater in the later period, but rather that an annual questionnaire survey of health authorities yields much more complete information than does an occasional literature survey.

FOOD-BORNE OUTBREAKS

TABLE 11.—*Food-borne outbreaks, 1938, by kind of food*

Kind of food	Number of outbreaks	Number of cases	Number of deaths
Pies and pastry	14	311	1
Pork and pork products	11	286	0
Fowl	5	94	1
Salads	5	179	3
Home-canned vegetables	5	11	6
Sausage	2	102	0
Veal	2	157	0
Gravy	2	70	7
Miscellaneous	24	1,037	7
Total	70	2,247	25

It will be noted that outbreaks traced to pies and pastry were more numerous than those traced to any other food product, and that the outbreaks traced to pork and pork products were second in frequency. Fowl, salads, and home-canned vegetables were responsible for 5 outbreaks each.

TABLE 12.—*Food-borne outbreaks, 1938, by diseases*

Disease	Number of outbreaks	Number of cases	Number of deaths
Botulism	5	11	6
Dysentery	3	118	0
Food poisoning	19	817	3
Gastroenteritis	23	1,015	0
Paratyphoid	1	21	0
Trichinosis	3	14	0
Typhoid fever	16	251	16
Total	70	2,247	25

Evidently, the food-borne disease most frequently involved for 1938 was gastroenteritis, with 23 outbreaks and 1,015 cases. The diseases next most frequently involved were "food poisoning" and typhoid fever, with 19 outbreaks, 817 cases, and 3 deaths, and 16 outbreaks, 251 cases, and 16 deaths, respectively.

TABLE 13.—*Food-borne outbreaks, 1938, by location*

State	Number of outbreaks	Number of cases	Number of deaths
Connecticut	1	6	0
Idaho	2	27	1
Iowa	1	45	3
Kansas	2	18	1
Kentucky	6	60	0
Maryland	7	367	1
Massachusetts	3	208	0
Michigan	3	27	1
Minnesota	3	13	0
Mississippi	1	200	0
New Jersey	10	290	0
New York	15	611	0
North Dakota	1	50	0
Ohio	1	53	1
Pennsylvania	4	83	7
Rhode Island	1	54	2
Tennessee	1	12	0
Texas	1	23	2
Utah	1	1	1
Virginia	1	17	0
Washington	3	8	5
Wisconsin	2	74	0
Total (22 States)	70	2,247	25

As in the case of water-borne outbreaks and milk-borne outbreaks New York State reported more food-borne outbreaks than did any other State, namely, 15. New Jersey was second with 10 outbreaks. Twenty-six States failed to report any food-borne outbreaks.

The significant fact brought out by table 15 is that, whereas only a small percentage of water and milk-borne outbreaks occurred in communities of over 10,000 population, this was not so in the case of food-borne outbreaks. Here 38 of the 70 outbreaks (54 percent) occurred in communities of 10,000 and over, which embraced 47.2 percent of the total population. It would appear, therefore, that while large communities are more advanced than small communities with respect to water and milk sanitation they do not excel with regard to food sanitation. This is not surprising since water sanitation and milk sanitation are much better understood in general than is food sanitation, pointing to the need of an intensive study of this subject.

TABLE 14.—*Food-borne outbreaks, 1938, by size of community*

Size of community	Outbreaks		Cases	
	Number	Percent	Number	Percent
1-99	10	14	114	5.1
100-199	5	7	190	8.4
200-499	6	9	343	15.3
500-999	2	3	8	.4
1,000-2,499	5	7	70	3.1
2,500-4,999	5	7	192	8.5
5,000-9,999	5	7	27	1.2
10,000-24,999	7	10	89	4.0
25,000-49,999	6	9	482	21.4
50,000-99,999	5	7	375	16.7
100,000-499,999	7	10	74	3.3
500,000 and over	6	9	260	11.6
Population unknown	1	1	23	1.0
Total	70	100	2,247	100.0

PREVIOUS KNOWN INCIDENCE OF FOOD-BORNE OUTBREAKS

The record of past food-borne outbreaks is unsatisfactory. However, following are several illustrative extracts from the literature.

In 1917 E. O. Jordan (*5*) reported that from press clipping bureaus and other sources he had collected for the period October 1913 to October 1915, 657 group and family outbreaks of "food poisoning" in the United States. In his opinion, "There is reason to believe that the majority of cases escape notice. Probably several thousand outbreaks of food poisoning in families and larger groups, affecting at least 15,000 to 20,000 persons, occur in the United States in the course of a year."

In 1924 Geiger (*6*) reported as follows: "It has been possible in some cases to study the records, and in other cases to participate in the investigation of over 800 outbreaks suspected of being food poisoning. These records cover a period of time from 1910 to the present date (1924), one-fourth of which (201) were reported in the period 1922 to 1924. It should be stated that the diagnosis of "ptomaine poisoning" is being loosely used by various members of the medical profession. Likewise it can be stated that in over 80 of these investigations, especially in those where it has been possible to reconstruct the history of the outbreak, or where subsequent autopsies were performed and investigations made, there were indications of other conditions than food poisoning, or that the food primarily blamed was not at fault. On the other hand, investigations have been made both from an epidemiological and laboratory standpoint, particularly at Rockford, Illinois, and Birmingham, Alabama, in which the causative food was determined and the contaminating organisms, paratyphoid A and B, respectively, were isolated."

In the publication referred to above (*6*) Geiger does not give the number of cases or deaths involved in the 800 outbreaks suspected of being "food poisoning," but in another publication (*7*) he reports that 749 of the outbreaks, which occurred between 1910 and 1922, inclusive, involved 5,210 persons and caused 399 deaths, a case

fatality rate of 7.5 percent. He further states that, based on the fact that the Bureau of the Census reported 7,316 deaths attributed to food poisoning during the period 1910–1920, and assuming that the same case fatality rate would apply, there were about 98,000 cases of food poisoning in the 10-year period. This would represent an average of about 9,800 cases per year as compared with the estimated 15,000 to 20,000 a year made earlier by Jordan. Geiger warns, however, that these assumptions may be misleading because of the unknown extent to which botulism, with its much higher case fatality rate, is involved in the food poisoning mortality reported by the Census.

COMPLETENESS OF REPORTING

It is improbable that the outbreaks reported herein are even approximately complete. Evidence as to this follows:

(1) Of the 48 water-borne outbreaks reported from all States New York State reported 24, or exactly half. It would be absurd to believe that New York State water supplies in general are so much less safe than those of the rest of the country that it actually experienced half of all water-borne outbreaks, despite the fact that it embraces only about one-tenth of our entire population. That would be approximately tantamount to saying that New York State water supplies are only one-fifth as safe as those of all other States combined.

(2) The same reasoning holds in the case of outbreaks conveyed through milk and milk products. New York State, California, and Minnesota combined reported nearly as many milk-borne outbreaks as all the rest of the country combined, although these three States represent only about one-sixth of our entire population.

(3) In the case of food-borne outbreaks New York State reported about one-sixth of all such outbreaks reported for the entire country, though New York represents only about one-tenth of our entire population.

(4) If we consider all outbreaks transmitted through all vehicles New York State reported 49 of the total of 169 for the entire country. This represents 30 percent of all outbreaks for 10 percent of the entire population.

(5) It is improbable that even New York State finds and reports all outbreaks which result from faulty sanitation.

(6) If the sanitary control of water supplies, milk supplies, and food supplies in New York State is as carefully done as in the average of the other States, which is a not unreasonable assumption, it follows that the actual number of outbreaks is probably at least three times as great as herein reported for 1938. If it is further assumed that even New York State is not perfect in its epidemiological work (not an unreasonable assumption) the above ratio of reported to actual outbreaks may be increased, perhaps considerably.

(7) All in all it seems safe to estimate that there are probably 5 to 10 or more times as many outbreaks, cases, and deaths resulting from faulty sanitation as are herein reported for 1938. Such an estimate would then represent 1,000 or more outbreaks, hundreds of thousands of cases, and 400 or more deaths per year resulting from faulty sanitation. That this is a conservative estimate is evidenced by the fact that during the past 5 years the total number of cases of typhoid fever alone occurring in the United States has been from 12,000 to 18,000 per year, and the fact that most typhoid fever cases are probably the result directly or indirectly of some breakdown in environmental sanitation.

(8) Finally, it should be noted that the above discussion takes no account of the fact that typhus fever, with 2,300 cases and 137 deaths in 1938, undulant fever, with at least 2,000 to 3,000 cases per year, and malaria with several hundred thousand cases and several thousand deaths per year are all the result of faulty environmental sanitation.

REFERENCES

(1) Wolman, A., and Gorman, A. E.: The significance of water-borne typhoid fever outbreaks, 1920–30. J. Am. Water Works Assoc., **23**: 160 (February 1931).

(2) Water-borne outbreaks in the United States and Canada 1930–36 and their significance. Eighth Annual Yearbook, American Public Health Association, 1937–38, page 142.

(3) Fuchs, A. W., and Frank, Leslie C.: Milk supplies and their control in American urban communities of over 1,000 population in 1936. Public Health Bulletin No. 245. U. S. Government Printing Office, 1939.

(4) Armstrong, Charles, and Parran, Thomas: Further studies on the importance of milk and milk products as a factor in the causation of outbreaks of disease in the United States. Supplement No. 62 to the Public Health Reports. U. S. Government Printing Office, 1927.

(5) Jordon, E. O.: Food poisoning. University of Chicago Science Series, 1917.

(6) Geiger, J. C.: The status of bacterial food poisoning in the United States. Am. J. Pub. Health, **14**: 302 (April 1924).

(7) Geiger, J. C.: Poisoning by food probably due to contamination with certain bacteria. J. Am. Med. Assoc., **81**: 1275 (October 13, 1923).

REPORT ON MARKET-MILK SUPPLIES OF CERTAIN URBAN COMMUNITIES

Compliance of the Market-Milk Supplies of Certain Urban Communities With the Grade A Pasteurized and Grade A Raw Milk Requirements of the Public Health Service Milk Ordinance and Code, as Shown by Compliance (Not Safety) Ratings of 90 Percent or More Reported by the State Milk-Sanitation Authorities During the Period July 1, 1938, to June 30, 1940

The accompanying list gives the fourteenth semiannual revision of the list of certain urban communities in which the pasteurized market milk is both produced and pasteurized in accordance with the Grade A pasteurized milk requirements of the Public Health Service Milk Ordinance and Code and in which the raw market milk sold to the final

consumer is produced in accordance with the Grade A raw milk requirements of said ordinance and code, as shown by ratings of 90 percent or more reported by State milk-sanitation authorities.

These ratings are not a complete measure of safety but represent the degree of compliance with the Grade A requirements of the Public Health Service Milk Ordinance and Code. Safety estimates should also take into account the percentage of milk pasteurized, which is given in the following tables.

The primary reason for publishing such lists from time to time is to encourage the communities of the United States to attain and maintain a high level of excellence in the public health control of milk supplies.

It is emphasized that the Public Health Service does not intend to imply that only those communities on the list are provided with high-grade milk supplies. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk-sanitation authority. In other cases the ratings which have been determined are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list, nor any reasonable local benefit to be derived therefrom.

The rules under which a community is included in this list are as follows:

(1) All ratings must have been determined by the State milk-sanitation authority in accordance with the Public Health Service rating method (Pub. Health Rep., **53:** 1386 (1938). Reprint No. 1970), based upon the Grade A pasteurized milk and the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

(2) No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk ratings are 90 percent or more. Communities which receive, without local inspection, milk from other sheds will be included in the list only if the locally inspected supply, as well as the shipped-in supply, shows a rating of 90 percent or more.

(3) The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old.

(4) The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such check rating is less than 90 percent but not less than 85, the city will be removed from the 90-percent list

after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for a period of 2 years from the date of the check survey unless a subsequent rating submitted during this period warrants its removal.

Communities are urgently advised to bring their ordinances up to date at least every 5 years, since ratings will be made on the basis of later editions if those adopted locally are more than 5 years old.

Communities which are not now on the list and desire to be rated should request the State milk-sanitation authority to determine their ratings and, if necessary, should improve their status sufficiently to merit inclusion in the list.

Communities which are now on the list should not permit their ratings to lapse, as ratings more than 2 years old cannot be used.

Communities which have not adopted the Public Health Service Milk Ordinance may wish to give thoughtful consideration to the advisability of doing so. It is obviously easier to satisfy the requirements upon which the rating method is based if these are included in the local legislation.

Communities which are enforcing the Public Health Service Milk Ordinance, but which have not yet been admitted to the list, should determine whether this has been the result of failure to enforce the ordinance strictly or failure to bring the ordinance up to date.

State milk-sanitation authorities which are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small, as in most States one milk specialist is sufficient for the work.

The inclusion of a community in this list means that the pasteurized milk sold in the community, if any, is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required for Grade A pasteurized milk is 90 percent or more and that, similarly, the raw milk sold in the community, if any, so nearly meets the requirements that the weighted average of the percentages of compliance with the various items of sanitation required for Grade A raw milk is 90 percent or more. However, high-grade pasteurized milk is safer than high-grade raw milk, because of the added protection of pasteurization. To secure this added protection, those who are dependent on raw milk can pasteurize the milk at home in the following simple manner: Heat the milk over a hot flame to 165° F., stirring constantly; then immediately place the vessel in cold water and continue stirring until cool.

TABLE 1.—*Communities in which all market milk is pasteurized. In these communities market milk complies with the Grade A pasteurized milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized milk ratings of 90 percent or more* [1]

Community	Percentage of milk pasteurized	Date of rating
ILLINOIS		
Aurora	100	May 3, 1940.
Brooklyn	100	Mar. 22, 1940.
Canteen	100	Do.
Centerville	100	Do.
East St. Louis	100	Do.
Elgin	100	Dec. 11, 1938.
Fairmont City	100	Mar. 22, 1940.
National City	100	Do.
Stites	100	Do.
MINNESOTA		
Albert Lea	100	Sept. 20, 1938.
Rochester	100	October 1938.
Winona	100	Aug. 12, 1938.
MISSOURI		
St. Louis	100	June 7, 1940.
NORTH CAROLINA		
Clinton	100	Aug. 18, 1939.
Fort Bragg	100	Do.
Greenville	100	June 15, 1940.
Sylva	100	May 10, 1940.
Tarboro	100	Nov. 1, 1938.

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more* [1]

[NOTE.—All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method]

Community	Percentage of milk pasteurized	Date of rating
ALABAMA		
Dothan	39	May 30, 1940.
Montgomery	28	Feb. 24, 1940.
Tuscaloosa	86	May 24, 1940.
ARKANSAS		
Fayetteville	59	May 1939.
Fort Smith	38	June 1939.
Jonesboro	37	May 1939.
Little Rock	49	October 1939.
Osceola	42	January 1940.
Pine Bluff	28	June 1939.
Texarkana	35	Aug. 16, 1939.
FLORIDA		
Coral Gables	97	April 1940.
Dania	95	Mar. 28, 1940.
Fort Lauderdale	95	Do.
Hollywood	95	Do.
Miami	97	April 1940.
Pompano	95	Mar. 28, 1940.
GEORGIA		
Americus	13	June 21, 1939.
Statesboro	40	Mar. 14, 1940.

See footnotes at end of table.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more*—Continued

Community	Percentage of milk pasteurized	Date of rating
ILLINOIS		
Chicago	99.9	May 20, 1939.
Decatur	87	Jan. 28, 1939.
Evanston	99.9	Apr. 17, 1940.
Glencoe	99.8	Apr. 11, 1940.
Highland Park	99.8	Do.
Kenilworth	99.8	Do.
Lake Bluff	99.8	Do.
Lake Forest	99.8	Apr. 11, 1940.
Peoria	97	May 23, 1940.
Waukegan	99.9	Apr. 3, 1940.
Winnetka	99.8	Apr. 11, 1940.
KANSAS		
Kansas City	51	December 1938.
Lawrence	69	May 1940.
Wellington	54	April 1940.
Wichita	75	December 1939.
KENTUCKY		
Berea	1	November 1939
Bowling Green	70	Dec 22, 1939.
Glasgow	68	June 27, 1939.
Henderson	45	June 11, 1940.
Jefferson County	43	August 1939.
Louisville	97	October 1939.
Richmond	22	November 1939.
MINNESOTA		
Little Falls	70	June 26, 1939.
MISSISSIPPI		
Greenville	58	May 25, 1939.
McComb	21	Dec. 6, 1938.
Tupelo	21	Jan. 6, 1939.
MISSOURI		
Clayton	(2)	Dec. 14, 1939.
Ferguson	(2)	Do.
Glendale	(2)	Do.
Kirkwood	(2)	Do.
Maplewood	(2)	June 7, 1940.
University City	(2)	Dec. 14, 1939.
Webster Groves	(2)	Do.
NEW MEXICO		
Albuquerque	69	November 1939.
Las Vegas	65	July 25, 1939.
Roswell	77	Aug. 8, 1939.
Santa Fe	44	December 1939.
NORTH CAROLINA		
Fayetteville	50	Aug 18, 1939.
Franklin	85	July 19, 1939.
Greensboro	79	August 1939.
Hendersonville	53	Sept 13, 1938.
Lumberton	36	May 29, 1940.
Mount Airy	47	Oct. 18, 1938.
Reidsville	69	Aug. 18, 1938.
Rockingham	53	Apr. 9, 1940.
Rocky Mount	50	Nov 29, 1938.
Tryon	49	July 24, 1939.
Waynesville	60	May 9, 1940.
Winston-Salem	78	November 1939.
NORTH DAKOTA		
Valley City	23	Nov. 10, 1939.
OHIO		
Athens	84	Oct. 6, 1938.

See footnotes at end of table.

TABLE 2.—*Communities in which some market milk is pasteurized. In these communities the pasteurized market milk complies with the Grade A pasteurized milk requirements and the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by pasteurized and raw milk ratings, respectively, of 90 percent or more*—Continued

Community	Percentage of milk pasteurized	Date of rating
OKLAHOMA		
Ada	55	June 27, 1940.
Bartlesville	45	Dec. 19, 1939.
Blackwell	35	Nov. 28, 1939.
Lawton	47	Feb. 22, 1939.
Muskogee	82	June 4, 1940.
Oklahoma City	73	Mar. 29, 1939.
Okmulgee	61	Nov. 8, 1939.
Seminole	63	Mar. 26, 1940.
Tulsa	74	Apr. 6, 1940.
OREGON		
Astoria	64	June 12, 1940.
Portland	82	Apr. 3, 1940.
Seaside	67	June 14, 1940.
SOUTH CAROLINA		
Walterboro	26	Dec. 6, 1939.
TENNESSEE		
Bristol	69	July 14, 1939.
TEXAS		
Abilene	67	Apr. 25, 1939.
Amarillo	73	Oct. 17, 1938.
Ballinger	49	Apr. 21, 1939.
Big Spring	34	Sept. 20, 1938.
Brownwood	21	Dec. 19, 1939.
Corpus Christi	87	May 26, 1939.
Dallas	77	Dec. 10, 1938.
Fort Worth	75	Feb. 25, 1939.
Gainesville	63	June 30, 1939.
Jacksonville	85	May 2, 1940.
Kerrville	74	Sept. 6, 1939.
Lamesa	38	June 10, 1940.
Lubbock	76	Oct. 25, 1939.
Palestine	23	Jan. 30, 1940.
San Angelo	65	May 13, 1940.
San Antonio	82	June 28, 1940.
Seguin	12	July 20, 1938.
Sherman	43	June 17, 1939.
Texarkana	26	Aug. 16, 1939.
Tyler	42	June 12, 1940.
Waco	48	Mar. 30, 1939.
VIRGINIA		
Bristol	69	July 14, 1939.
Lexington	41	Oct. 26, 1939.
Pulaski	77	Sept. 20, 1939.
South Boston	72	Sept. 22, 1939.
Waynesboro	95	Oct. 11, 1939.
Williamsburg	41	May 3, 1939.
WASHINGTON		
Camas	8	May 22, 1939.
Vancouver	31	May 25, 1939.
Walla Walla	53	Apr. 14, 1939.
Yakima	67	Apr. 20, 1939.
WEST VIRGINIA		
Huntington	66	June 5, 1939.
WYOMING		
Casper	71	Aug. 17, 1938.
Cheyenne	74	July 7, 1938.

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.
[2] The percentage of the total milk supply pasteurized cannot be accurately determined owing to the overlapping of milk routes.

TABLE 3.—*Communities in which no market milk is pasteurized, but in which the raw market milk complies with the Grade A raw milk requirements of the Public Health Service Milk Ordinance and Code to the extent shown by raw milk ratings of 90 percent or more* [1]

[NOTE.—All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method]

Community	Date of rating
ALABAMA	
Bridgeport	June 29, 1940.
Lanett	Mar. 19, 1940.
Scottsboro	June 29, 1940.
Stevenson	Do.
FLORIDA	
Apalachicola	January 1940.
KANSAS	
Horton	June 1940.
KENTUCKY	
Somerset	November 1930.
MISSISSIPPI	
Canton	Oct. 17, 1938.
Greenwood	Nov. 22, 1938.
Hollandale	Nov. 30, 1938.
Holly Springs	Jan. 4, 1939.
Leland	Nov. 30, 1938.
Magnolia	Dec. 6, 1938.
Yazoo City	Oct. 12, 1938.
MISSOURI	
Brentwood	June 7, 1940.
NORTH CAROLINA	
Ahoskie	Oct. 20, 1938.
Aulander	Nov. 8, 1938.
Belhaven	Oct. 26, 1938.
Bethel	May 15, 1940.
Bladenboro	Aug. 23, 1939.
Brevard	July 28, 1939.
Calypso	May 23, 1940.
Clarkton	Aug. 23, 1939.
Colerain	Nov. 8, 1938.
Dunn	July 6, 1939.
Edenton	Nov. 7, 1938.
Elkin	Sept. 18, 1939.
Faison	May 23, 1940.
NORTH CAROLINA—continued	
Farmville	May 15, 1940.
Hope Mills	Aug. 18, 1939.
Kelford	Nov. 8, 1938.
Kenansville	May 23, 1940.
Lewiston	Nov. 8, 1938.
Mars Hill	Feb. 21, 1939.
Mount Olive	Aug. 22, 1939.
Murfreesboro	Oct. 20, 1938.
North Wilkesboro	July 1938.
Pilot Mountain	Sept. 20, 1939.
Powellsville	Nov. 8, 1938.
Red Springs	May 29, 1940.
Rosehill	May 23, 1940.
Roxobel	Nov. 8, 1938.
Wallace	May 23, 1940.
Warsaw	Do.
Wilkesboro	July 29, 1938.
Windsor	Nov. 8, 1938.
Woodville	Do.
SOUTH CAROLINA	
Hartsville	Nov. 9, 1939.
TEXAS	
Canyon	Oct. 14, 1938.
Colorado	Nov. 3, 1939.
Commerce	Mar. 16, 1939.
Del Rio	Apr. 20, 1939.
Kermit	Sept. 12, 1938.
VIRGINIA	
Blackstone	Nov. 2, 1939.
Boydton	Apr. 26, 1939.
WEST VIRGINIA	
Grantsville	June 7, 1939.

[1] Note particularly the percentage of milk pasteurized in the various communities listed in these tables. This percentage is an important factor to consider in estimating the safety of a city's milk supply.

SUSCEPTIBILITY AND RESISTANCE OF CERTAIN SPECIES OF AMERICAN DEER MICE, GENUS *PEROMYSCUS*, AND OTHER RODENTS TO *LEPTOSPIRA ICTEROHAEMORRHAGIAE* [1]

By ARDZROONY PACKCHANIAN, *Protozoologist, Division of Infectious Diseases, National Institute of Health, United States Public Health Service*

INTRODUCTION

The guinea pig has been the most widely used of laboratory animals in the diagnosis of infection with *Leptospira icterohaemorrhagiae.*

The American deer mouse, genus *Peromyscus*, (*1*, *9*) has not hitherto been studied as to its susceptibility and resistance to *Leptospira ictero-*

[1] Part of this work was performed at the Department of Bacteriology and Immunology, Washington University, St. Louis, Mo., during the academic year of 1933–34.

haemorrhagiae, nor has it been looked upon as a carrier of this organism, or considered as a suitable laboratory animal for the diagnosis of Weil's disease and for experimental studies of icterohemorrhagic spirochetosis. Inasmuch as over 43 species and 143 subspecies of the genus *Peromyscus* are widely distributed on the North American continent (*1, 2, 3, 7*), such a study was considered desirable.

METHODS AND MATERIAL

Experimental animals.—The various species of American deer mice (*Peromyscus*) used in this study were largely cage-bred at the Maryland Caviaries, Baltimore, Md., and at the National Institute of Health, Washington, D. C. Other rodents used were captured in nature in the following States: Alabama, Arizona, California, Florida, Oregon, and Texas. The tail blood of newly captured animals was examined microscopically, a few days after their receipt at the laboratory, for the presence of spirochetes and trypanosomes. Those mice in which such examination showed no evidence of natural trypanosomiasis or spirochetosis were kept at least a month under laboratory conditions before they were used in these studies.

The strains of Leptospira icterohaemorrhagiae.—While a number of American and European strains [2] have been used during the progress of this study, only 6 were utilized for inoculation of large numbers of animals for comparative study. These 6 strains,[3] their sources, and designations in this report are as follows: 1. St. Louis mouse strain No. 33, isolated in 1933 from an albino mouse, *Mus musculus*, in St. Louis, Mo.; 2. Type I New York City rat strain No. 38, isolated during 1938 from a wild rat captured in a fish market in New York City where two cases of Weil's disease occurred during 1938; 3. Type I human European strain No. 41; 4. Type I human European strain No. 56. The first 2 strains were isolated by the writer, while the last 2 were isolated by Schüffner and his colleagues in Europe; 5. Strain No. 79 was isolated originally from a dog by Dr. Peter Olatson of the New York State Veterinary College and sent to Washington by Dr. W. S. Monlux; 6. Strain No. 80 was isolated from a fatal human case in the New York Post-Graduate Hospital by Dr. E. Farrell and forwarded to the writer by Professor Ward J. MacNeal. The last 2 strains have not yet been typed.

Inoculations.—In most of the work described, *Leptospira* were maintained in guinea pigs or deer mice for transfer. Infected animals

[2] The writer wishes to express his sincere appreciation and thanks to Dr H. C. Brown, London, England; Dr. W. A. P. Schuffner, Amsterdam, Holland; Dr. J. Smith, Aberdeen, Scotland; Dr. B. Walch-Sorgdrager, Amsterdam, Holland; Dr. W. S. Monlux, Ithaca, N. Y.; and Dr. Ward J. MacNeal, New York City, for furnishing various pathogenic and avirulent strains of *Leptospira*. Thanks are due also to members of the Department of Health, City of Detroit, particularly to Dr. Henry F. Vaughan, Dr Joseph Molner, and Dr. J. Kasper for making it possible during a field study at Detroit to collect live wild rats (*Rattus norvegicus*) from which strains of *Leptospira* were isolated for experimental studies.

[3] The classification of these strains into "types" is based on observations of the writer (*6*).

were bled at the height of infection. The blood was defibrinated and a suspension was prepared by dilution with an equal amount of physiological salt solution or Ringer's solution. A direct cover glass preparation of such suspensions examined with an oil immersion lens under dark-field illumination showed at least three *Leptospira* per microscopic field. When large series of animals were inoculated all were given about 0.25 cc. of this suspension intraperitoneally. When less than 3 animals were inoculated at a given time this procedure was varied in that injections were made with 2 drops of ear blood from an infected guinea pig or with blood from the tail of an infected *Peromyscus*. In each instance the blood was suspended in about 0.5 cc. salt solution.

In some instances the source of *Leptospira* was scrapings from the surface of the cortex of the kidneys of naturally infected wild rats (*Rattus norvegicus*) and occasionally from virulent or slightly virulent cultures grown *in vitro*. The latter cultures invariably contained over a million *Leptospira* per cc.

Subsequent examination of inoculated animals.—Following inoculation most animals were observed daily for evidence of infection. Droplets of blood were examined by dark-field illumination, usually with the oil immersion lens (objective 91×, ocular 10×). With sufficient experience it is possible to identify and estimate the number of spirochetes present in such a specimen within a relatively short time.

In addition to examination of the blood, all animals were carefully observed for the development of jaundice in the ears, feet, toes, and sclerae. In some animals the color of the urine and loss in weight were also recorded. At autopsy, jaundice and hemorrhage in the internal organs and in the thoracic and abdominal cavities were looked for. Sections taken from various organs were fixed in 10 percent formaldehyde and stained with Levaditi's or Warthin's stains.

EXPERIMENTAL FINDINGS

Isolation of Leptospira icterohaemorrhagiae, St. Louis mouse strain No. 33, and results of its inoculation in various species of Peromyscus and guinea pigs.—*Leptospira icterohaemorrhagiae*, St. Louis strain No. 33, was accidentally recovered from a naturally infected "laboratory white mouse," *Mus musculus*, in 1933. This mouse was also found to be infected with *Spirochaeta morsus muris*[4] (*4, 5, 6*). Suspensions of the blood and macerated organs of this naturally infected mouse were inoculated into *Peromyscus eremicus fraterculus*, *P. maniculatus rufinus*, *P. truei truei*, and *Mus musculus*. All the animals, with the exception of *Mus musculus*, developed leptospirochetosis and died. In this series the first animal to die of leptospirochetosis was one of

[4] *Spirochaeta morsus muris* is not fatal to the species of *Peromyscus* used (see table 1); however, it produces a light and prolonged infection in these animals, such as is seen in *Mus musculus*.

the *P. m. rufinus* which succumbed to the disease on the ninth day. However, leptospirochetes were demonstrable in the blood of most animals by the fifth day, and the blood was swarming with spirochetes by the ninth day.

Blood taken from one of the *P. e. fraterculus* at the height of illness was inoculated into other species of *Peromyscus* and in this manner the strain was passed serially. By passage from *Peromyscus* to *Peromyscus*, *Leptospira icterohaemorrhagiae* was apparently increased in virulence since it first killed these animals in 9 days, then in 7, and finally in about 3 days.

The strain was also cultured in semisolid serum agar and has been maintained in subcultures for 2 years.

Table 1 summarizes the number of animals and the different species inoculated with this strain, together with the results of the inoculations. It is noted that all animals of all species of *Peromyscus* used with this strain suffered external jaundice, invasion of the blood stream with spirochetes, internal hemorrhage, and death. There was some variation between species in the duration of life following inoculation and in the severity of jaundice observed.

TABLE 1.—*The virulence of Leptospira icterohaemorrhagiae, St. Louis strain No. 33, for species of American deer mice, Peromyscus, and other rodents*

Species	Number of animals inoculated with *Leptospira*	Duration of life after inoculation in days [1]			Remarks		
		Min.	Max.	Aver.	External jaundice	Microscopic demonstration of *Leptospira* in blood	Macroscopic internal hemorrhage
Peromyscus eremicus fraterculus	6	3	10	5.1	+	++	++
Peromyscus maniculatus artemisiae	10	3	7	4.7	+	++	++
P. m. bairdii	6	3	6	4.1	+	++	++
P. m. blandus	6	4	8	4.5	+	++	++
P. m gambelii (colored)	10	3	7	3 9	+	++	++
P. m. gambelii (albino)	20	3	8	3.8	+++	++	++
P. m. gambelii (hairless)	20	3	7	3.7	+++	++	++
P. m. hollisteri	3	4	8	6	+	++	++
P. m. osgoodii	6	4	7	5.3	+	++	++
P. m. rubidus	20	3	10	5 2	+	++	++
P. m. rufinus	4	3	10	6 5	+	++	++
P. truei truei	2	7	9	8	+	++	++
Mus musculus	6	(2)	(2)	(2)	None	(3)	None
Rattus norvegicus	6	(2)	(2)	(2)	None	(3)	None

[1] All animals except *Mus musculus* and *Rattus norvegicus* died.
[2] All survived, chronic carrier. "Chronic carrier" indicates that *Leptospira* were seen and isolated from the surviving *Mus musculus* and *Rattus norvegicus* which were sacrificed 3 to 6 months after inoculation.
[3] Found in kidneys when sacrificed.

In all *Peromyscus* the microscopic pathology of the sections from each organ (stained by hematoxylin and eosin) showed necrotic areas in the liver and hemorrhagic emboli in practically every organ. Levaditi's and Warthin's stains revealed large numbers of leptospirochetes in each section.

It is further noted in table 1 that, although none of the inoculated *Mus musculus* and *Rattus norvegicus* died, all suffered abortive invasion of the blood stream with *Leptospira* and became chronic urinary carriers.

It is of interest that this strain of *Leptospira* was not lethal to guinea pigs shortly after its isolation. Following several transfers through *Peromyscus*, however, guinea pigs succumbed to inoculations.

Results of inoculation of animals with Leptospira icterohaemorrhagiae Type I New York City rat strain No. 38.[5]—A wild rat (*Rattus norvegicus*) caught in New York City was sacrificed. The serum from this rat agglutinated with Type I *Leptospira icterohaemorrhagiae* in a dilution up to 1: 10,000. At autopsy the kidneys of this animal were examined microscopically and a number of active *Leptospira* were found. Some of the suspension of the macerated kidneys was inoculated into a young albino guinea pig and 7 days later about one *Leptospira* per microscopic field was demonstrable in the guinea pig's blood. External jaundice was noticeable at the same time. Heart blood taken on the seventh day was inoculated into several species of rodents, the results of which are summarized in table 2.

TABLE 2.—*Susceptibility of certain species of rodents to Type I Leptospira icterohaemorrhagiae, New York City rat strain No. 38*

Species	Number of animals inoculated with *Leptospira*	Fatality in days			Remarks		
		Min.	Max.	Aver.	External jaundice	Microscopic demonstration of *Leptospira* in blood	Macroscopic internal hemorrhage
Peromyscus eremicus eremicus	6	4	5	4.9	++	++++	++
Peromyscus leucopus noveboracensis	10	5	[1] 100+	?	++	±	±
Peromyscus maniculatus (albino)	6	4	5	4.5	++++	++++	++
Peromyscus polionotus	10	4	6	4.1	++	+++	+
Neotoma fuscipes fuscipes	1	6	6	6	+	+	+
Mus musculus	8	(2)	(2)	(2)	None	(3)	−
Rattus norvegicus	8	(2)	(2)	(2)	None	(3)	−

[1] All animals except *Mus musculus* and *Rattus norvegicus* died.
[2] Survived, chronic carrier. "Chronic carrier" indicates that *Leptospira* were seen and isolated from the surviving *Mus musculus* and *Rattus norvegicus* which were sacrificed 3 to 6 months after inoculation.
[3] Found in kidneys.

It is seen in table 2 that in the 4 species of *Peromyscus* and in *Neotoma fuscipes fuscipes* frank infection was evident in that external jaundice, particularly of the ears, toes, and feet, was present and *Leptospira* were demonstrable in the blood. All of the animals succumbed. At autopsy they showed internal hemorrhages and jaundice. Of the 10 *P. leucopus noveboracensis* inoculated, only 3 died. Three

[5] Two additional strains of *Leptospira icterohaemorrhagiae* were isolated from wild rats (*Rattus norvegicus*), one of these strains from Detroit rats during 1938, the other from a rat captured in a house in Washington, D. C. (strain 78). The scrapings from the kidneys of these rats were inoculated into 16 albino deer mice (*P. maniculatus gambelii*), all of which died within 8 days with icterohemorrhagic spirochetosis.

inoculated *Mus musculus* and 3 *Rattus norvegicus* survived; these animals became carriers of *Leptospira* as demonstrated by the presence of organisms in their kidneys when sacrificed about 3 to 6 months following the inoculation.

Susceptibility and resistance of various species of rodents to Leptospira icterohaemorrhagiae, Type I human strains No. 41 and No. 56.—At various intervals 191 rodents of 22 different species and subspecies were inoculated with one or the other of 2 human strains of Type I *Leptospira icterohaemorrhagiae* (strain No. 41 or No. 56). The results of these inoculations are summarized in table 3. Since there were apparently no differences in virulence between strains No. 41 and No. 56, they are not differentiated in this table. Among the individuals of some species a few recoveries occurred. The blood serum of these recovered animals agglutinated freshly prepared formalinized antigen of Type I *Leptospira icterohaemorrhagiae*. The agglutination reaction was prompt and clear cut, the titer being about 1:10,000 (*10*).

The susceptibility and resistance of 14 species and subspecies of rodents to Leptospira icterohaemorrhagiae, Ithaca, N. Y., dog strain No. 79.—A guinea pig experimentally infected with the Ithaca dog strain of *Leptospira* was etherized at the height of infection; the heart blood of the guinea pig was removed, defibrinated, and 0.25 cc. amounts inoculated into each animal, representing 14 species and subspecies of rodents (see table 4).

All the inoculated animals of the following species died of icterohemorrhagic spirochetosis within 7 days: One kangaroo rat (*Dipodomys merriami merriami*); 2 white-throated wood rats (*Neotoma albigula albigula*); 2 Baird wood rats (*Neotoma micropus micropus*); 1 parasitic mouse (*Peromyscus californicus californicus*); 10 desert deer mice (*P. eremicus eremicus*); 10 albino deer mice (*P. maniculatus gambelii*); 10 old-field deer mice (*P. polionotus polionotus*); 1 true white-footed mouse (*P. truei truei*); and 1 harvest mouse (*Reithrodontomys* sp.?).

Leptospira were demonstrated more readily and in larger numbers in the peripheral blood of *P. e. eremicus*, *P. m. gambelii*, and *P. p. polionotus;* the number of *Leptospira* seen in the peripheral blood of these infected animals varied, depending on the stage of the disease, from one to over 100 per microscopic field (objective 91×, ocular 10×).

The external and internal jaundice was very pronounced in albino *Peromyscus maniculatus gambelii.*

Internal hemorrhage was noted in most animals which succumbed to the disease (see table 4).

TABLE 3.—*The susceptibility and resistance of 22 species and subspecies of rodents to Leptospira icterohaemorrhagiae Type I (human strains No. 41 and No. 56)*

Species	Popular name	Number of animals inoculated with *Leptospira*	Fatality in days			Remarks			
			Min.	Max.	Aver.	External jaundice	Microscopic demonstration of *Leptospira* in blood	Macroscopic internal hemorrhage	Type of infection
Ammospermophilus harrisii harrisii	Antelope ground squirrel	1	7	7	7	±	-----	-----	Fatal.
Neotoma albigula albigula	White-throated wood rat	2	4	7	5.5	++	+	-----	Do.
Neotoma fuscipes fuscipes	Dusky-footed wood rat	1	6	6	6	++	+	+	Acute, fatal.
Onychomys torridus torridus	Coues grasshopper	2	8	9	8.5	++	–	-----	Fatal.
Perognathus penicillatus pricei	Desert pocket mouse	3	7	8	7.6	++	–	-----	Do.
Peromyscus boylii rowleyi	Boyle deer brush mouse	3	9	10	9.3	++	+	++	Acute, fatal.
P. californicus californicus	Parasitic deer mouse	3	7	8	9	++	+	+	Do.
P. eremicus anthonyi	Apache desert mouse	10	3	11	7	++	++	++	Do.
P. eremicus eremicus	Desert deer mouse	46	3	10	6.2	++	++	++	Do.[1]
P. eremicus fraterculus	San Diego desert mouse	4	3	9	6	++	++	++	Acute, fatal.
P. floridanus floridanus	Florida white-footed mouse	5	42	4 survived		–	–	-----	Usually not fatal.[2]
P. gossypinus gossypinus	Cotton deer mouse	3	All survived			–	–	-----	Not fatal.
P. leucopus noveboracensis	Forest deer mouse	20	6+	17 survived		++	–	±	Usually not fatal.[3]
P. maniculatus gambelii (albino)	White deer mouse	20	4	8	6	++++	+++	++	Acute, fatal.[4]
P. m. nebrascensis	Nebraska sand hill deer mouse	2	9	1 survived		++	++	++	Usually fatal.[5]
P. m. sonorensis	Sonoran white-footed mouse	8	10	2 survived		++	+	+	Do.[6]
P. polionotus polionotus	Old-field mouse	12	6	9	7	++	+++	+	Acute, fatal.
Peromyscus truei truei	True deer mouse	3	8	9	10	++	++	+	Fatal.
Rattus norvegicus (albino)	Laboratory white rat	26	All survived			None	Kidney+	–	Not fatal, chronic carrier.[7]
Reithrodontomys	Harvest mouse	3	8	2 survived		++	-----	-----	Usually not fatal.[8]
Sigmodon hispidus hispidus	Northern cotton rat	4	10	3 survived		++	+	-----	Do.[9]
Mus musculus	Common laboratory mouse	10	All survived			None	Kidneys+	None	Not fatal, chronic carrier.[7]

[1] 44 out of 46 fatal.
[2] 1 out of 5 died.
[3] 3 out of 20 died.
[4] 19 out of 20 fatal.
[5] 4 out of 5 fatal.
[6] 6 out of 8 fatal.
[7] "Chronic carrier" indicates that *Leptospira* were seen and isolated from the kidneys of the surviving *Mus musculus* and *Rattus norvegicus* sacrificed 6 months to a year after inoculation.
[8] 1 out of 3 died.
[9] 1 out of 4 died.

TABLE 4.—*Susceptibility and resistance of 14 species of rodents to Leptospira icterohaemorrhagiae, Ithaca, N. Y., dog strain No. 79*

Species	Number of animals of each species	Microscopic examination of blood for *Leptospira*: Days following inoculation of the animals						Degree of external jaundice	Autopsy		Fatality in days
		2	5	6	7	8	10		Degree of internal jaundice	Degree of internal hemorrhage	
Dipodomys merriami merriami	1	0	dead	------	------	------	------	±	±	++	5
Neotoma albigula albigula	1	0	1	dead	------	------	------	±	±	+	6
Do	2	0	1/10	3	dead	------	------	+	+	++	7
Neotoma micropus micropus	1	0	0	0	dead	------	------	+	+	++	7
Do	2	0	1/5	dead	------	------	------	0	0	+++	6
Peromyscus californicus californicus	1	0	2	dead	------	------	------	+	+	++	6
Peromyscus eremicus eremicus	1	0	10, dead	------	------	------	------	+	++	+++	5
Do	2	0	2, dead	------	------	------	------	+	++	+++	5
Do	3	0	5	dead	------	------	------	+	++	++	6
Do	4	0	10	dead	------	------	------	+	+	++	6
Do	5	0	0	dead	------	------	------	+	+	++	6
Do	6	0	10	dead	------	------	------	+	+	++	6
Do	7	0	5	dead	------	------	------	+	+	++	6
Do	8	0	5	dead	------	------	------	+	+	++	6
Do	9	0	2	dead	------	------	------	+	+	++	6
Do	10	0	10	dead	------	------	------	+	+	++	6
Peromyscus gossypinus gossypinus	1	0	2	dead	------	------	------	++	+	+	6
Do	2	0	1/5	dead	------	------	------	++	+	+	6
Do	3	0	1/2	dead	------	------	------	++	+	+	6
Do	4	0	0	dead	------	------	------	++	+	+	6
Do	5	0	0	1/50, dead	------	------	------	++	+	+	6
Do	6	0	1/5	------	------	------	dead	++	+	+	10
Peromyscus leucopus noveboracensis	1	0	0	0	dead	------	------	+++	+++	++	7
Do	2	0	0	0	dead	------	------	+++	+++	++	7
Do	3	0	0	0	0	dead	------	+++	+++	++	8
Do	4	0	0	0	0	dead	------	+++	+++	++	8
Do	5	0	0	0	0	0	0	0	------	------	alive
Do	6	0	0	dead	------	------	------	+++	+++	++	6
Do	7	0	0	dead	------	------	------	+++	+++	++	6
Do	8	0	0	0	dead	------	------	+++	+++	++	7
Do	9	0	0	0	0	0	0	++	++	++	15
Do	10	0	0	0	0	0	0	------	------	------	alive
Peromyscus maniculatus gambelii (albino)	1	0	50, dead	------	------	------	------	++++	++++	+++	5
Do	2	0	50, dead	------	------	------	------	++++	++++	+++	5
Do	3	0	50	dead	------	------	------	++++	++++	+++	6
Do	4	0	50	dead	------	------	------	++++	++++	+++	6
Do	5	0	50	100, dead	------	------	------	++++	++++	+++	6
Do	6	0	dead	------	------	------	------	++++	++++	+++	5
Do	7	0	50, dead	------	------	------	------	++++	++++	+++	5
Do	8	0	50	dead	------	------	------	++++	++++	++	6
Do	9	0	0	dead	------	------	------	++++	++++	++	6
Do	10	0	0	dead	------	------	------	++++	++++	++	6
Peromyscus polionotus polionotus	1	0	10, dead	------	------	------	------	++	++	++	5
Do	2	0	10	dead	------	------	------	++	++	++	6
Do	3	0	10	dead	------	------	------	++	++	++	6
Do	4	0	10	dead	------	------	------	++	++	++	6
Do	5	0	10	dead	------	------	------	++	++	++	6
Do	6	0	dead	------	------	------	------	++	++	++	5
Do	7	0	dead	------	------	------	------	++	++	++	5
Do	8	0	dead	------	------	------	------	++	++	++	5
Do	9	0	10	dead	------	------	------	+	+	++	6
Do	10	0	10	dead	------	------	------	+	+	++	6
Peromyscus truei truei	1	0	3	dead	------	------	------	+	+	++	6
Reithrodontomys fulvescens fulvescens	1	0	1	dead	------	------	------	+	+	++	6

See footnotes at end of table.

TABLE 4.—*Susceptibility and resistance of 14 species of rodents to Leptospira icterohaemorrhagiae, Ithaca, N. Y., dog strain No. 79*—Continued

Species	Number of animals of each species	Microscopic examination of blood for *Leptospira*: Days following inoculation of the animals: 2	5	6	7	8	10	Degree of external jaundice	Autopsy: Degree of internal jaundice	Autopsy: Degree of internal hemorrhage	Fatal in days
Guinea pig	1	0	0	0	1/50, dead	------	------	++++	++++	++++	7
Do	2	0	0	0	0	1/50, dead	------	++++	++++	++++	8
Mus musculus	1	0	0	0	0	0	0	--------	--------	--------	alive
Do	2	0	0	0	0	0	0	--------	--------	--------	alive
Do	3	0	0	0	0	0	0	--------	--------	--------	alive
Rattus norvegicus	1	0	0	0	0	0	0	--------	--------	--------	alive
Do	2	0	0	0	0	0	0	--------	--------	--------	alive

NOTE.—Animals marked "alive" in the last column survived inoculation and appeared healthy at the time of this writing, 43 days following the inoculation.

1/2, 1/5, 1/10 signifies that one spirochete was demonstrable per 2, 5, or 10 microscopic fields (objective 91×, ocular 10×).

Of 10 forest deer mice (*P. leucopus noveboracensis*), 8 died within 15 days and 2 survived over 2 months. The 8 mice which died were very yellow, particularly in the toes. No *Leptospira* were found in the peripheral blood of these 10 forest deer mice by microscopic search.

Three white mice (*Mus musculus*) and 2 rats (*Rattus norvegicus*) which were used as controls survived inoculation and no *Leptospira* were demonstrated in the peripheral blood, nor was external jaundice noted.

Two guinea pigs which were used as controls contracted the infection and died, one on the seventh day and the other on the eighth day of illness with characteristic jaundice and hemorrhages.

The susceptibility of four species of American deer mice to Leptospira icterohaemorrhagiae, New York City human strain No. 80.—A guinea pig which was experimentally infected with this strain of *Leptospira* at the height of infection was etherized, its heart blood removed, defibrinated, and 0.25 cc. amounts inoculated into 41 deer mice (1 *Peromyscus californicus californicus*, 10 *P. eremicus anthonyi*, 10 *P. eremicus eremicus*, 10 albino *P. maniculatus gambelii*, and 10 *P. polionotus polionotus*), 10 guinea pigs, 10 white mice (*Mus musculus*), and 10 rats (*Rattus norvegicus*) (see table 5).

All 41 of the inoculated deer mice contracted the infection and died in from 4 to 7 days (see table 5). *Leptospira* were demonstrated in the blood on the third day following inoculation. At the early stage of the disease only one *Leptospira* was seen in about 50 microscopic fields (objective 91×, ocular 10×), but the number soon increased and occasionally over 100 *Leptospira* were demonstrable per microscopic field (see table 5). The external jaundice, particularly in the ears, sclerae, toes, and tail, was more pronounced and of diagnostic

significance, especially in albino deer mice (*P. m. gambelii*). At autopsy internal jaundice and hemorrhages were noted in most animals; these features were more distinct in *P. m. gambelii*.

TABLE 5.—*Susceptibility of four species of American deer mice to Leptospira icterohaemorrhagiae, New York City human strain No. 80*

Species	Number of animals of each species	Microscopic examination of blood for *Leptospira* — Days following inoculation of the animals: 3	4	5	6	7	8	Degree of external jaundice	Autopsy: Degree of internal jaundice	Autopsy: Degree of internal hemorrhage	Fatality in days
P. californicus californicus	1	0	0	1/10	10 dead	------	------	+	+	+	6
P. eremicus anthonyi	1	0	1/50	dead	------	------	------	+	+	++	5
Do	2	0	0	1/10	dead	------	------	+	+	++	6
Do	3	0	0	1/2	dead	------	------	±	+	++	6
Do	4	0	0	1/2	dead	------	------	±	+	++	6
Do	5	0	0	1/5	0	dead	------	+	+	++	7
Do	6	2	dead	------	------	------	------	+	+	++	4
Do	7	0	0	10 dead	------	------	------	+	+	++	5
Do	8	0	0	5	dead	------	------	±	±	++	6
Do	9	0	0	5	dead	------	------	±	+	++	6
Do	10	0	0	2	dead	------	------	±	+	++	6
P. eremicus eremicus	1	0	2	3	dead	------	------	+	+	++	6
Do	2	0	1/50	1/50	dead	------	------	+	+	++	6
Do	3	0	0	1/50	dead	------	------	+	+	++	6
Do	4	0	0	1/50	1/2 dead	------	------	+	+	++	6
Do	5	0	0	1/50	1/2	dead	------	+++	+++	++	7
Do	6	0	0	2	dead	------	------	+	+	++	6
Do	7	0	0	1/10	dead	------	------	+	+	++	6
Do	8	0	0	1/10	dead	------	------	+	+	++	6
Do	9	0	0	0	dead	------	------	+	+	++	6
Do	10	0	0	0	10 dead	------	------	+++	+++	+++	6
P. maniculatus gambelii (albino)	1	2	5	dead	------	------	------	++++	++++	+++	5
Do	2	0	2	dead	------	------	------	++++	++++	+++	5
Do	3	0	2	2 dead	------	------	------	+++	++++	+++	5
Do	4	0	2	2	dead	------	------	+++	++++	+++	6
Do	5	0	1/50	1/10	dead	------	------	+++	++++	+++	6
Do	6	0	2	2 dead	------	------	------	+++	+++	+++	5
Do	7	0	1/10	2 dead	------	------	------	+++	+++	+++	5
Do	8	0	1/10	2	dead	------	------	++++	++++	+++	6
Do	9	0	0	• 2	dead	------	------	++++	++++	++++	6
Do	10	0	2	100	dead	------	------	++++	++++	++++	6
P. polionotus polionotus	1	0	dead	------	------	------	------	++	++	+++	4
Do	2	0	1/10	dead	------	------	------	++	++	+++	5
Do	3	0	1/10	50 dead	------	------	------	++	++	+++	5
Do	4	0	1/10	20 dead	------	------	------	++	++	+++	5
Do	5	0	0	2	1/5	dead	------	++	++	++	7
Do	6	0	1/10	dead	------	------	------	0	±	++	5
Do	7	0	1/10	5 dead	------	------	------	++	++	++	5
Do	8	0	1/10	2 dead	------	------	------	+	+	++	5
Do	9	0	1/10	2 dead	------	------	------	+	++	++	5
Do	10	0	1/50	1/50	1 dead	------	------	+	++	++	6
Guinea pig	1	0	0	0	0	1 dead	------	++++	++++	++++	7
Do	2	0	0	0	0	1/10	dead	++++	++++	++++	8
Mus musculus	1	0	0	0	0	0	0	0	------	------	alive
Do	2	0	0	0	0	0	0	0	------	------	alive
Rattus norvegicus	1	0	0	0	0	0	0	0	------	------	alive
Do	2	0	0	0	0	0	0	0	------	------	alive

Remarks: 1/2, 1/5, 1/10, 1/50 signifies that only one *Leptospira* was seen per 2, 5, 10, or 50 microscopic field (objective 91X, ocular 10X).

The cipher ("0") signifies that no *Leptospira* were found microscopically in the blood during about one minute microscopic search.

Mus musculus and *Rattus norvegicus* are still alive (50 days) and show no external signs of illness.

Two guinea pigs which were inoculated as controls died of icterohemorrhagic spirochetosis, one on the seventh day, and the other on the eighth day of infection. The mice (*Mus musculus*) and the rats (*Rattus norvegicus*) which were also inoculated as controls survived. In the peripheral blood of these two species of rodents no *Leptospira* were seen, and the animals showed no signs of jaundice.

Two additional albino deer mice (*P. m. gambelii*) were inoculated with a culture of this strain of *Leptospira*. One of the mice died on the fifth day following the inoculation, with characteristic jaundice and hemorrhages, while the other mouse survived. Three weeks later this surviving deer mouse was inoculated with virulent material of *Leptospira* derived from *P. m. gambelii*. This deer mouse manifested pronounced resistance to the second inoculation; no *Leptospira* were found in the blood and the mouse survived and proved to be immune to further inoculations with *Leptospira icterohaemorrhagiae;* 5 control deer mice which were inoculated with the same inoculum contracted the infection and all died of leptospirochetosis within 6 days.

Six serial passages of the New York human strain of *Leptospira* from one albino deer mouse to another did not change the virulence of the strain for this species of rodents. All the subinoculated albino deer mice contracted the infection. *Leptospira* were demonstrated in the peripheral blood of these animals in larger numbers. They showed distinct external jaundice and all died within a week. At autopsy the internal jaundice and hemorrhages were, as a rule, constant features in these animals, justifying the name of icterohemorrhagic spirochetosis for the disease.

DISCUSSION

From the experimental data on hand it is evident that whenever a strain of *Leptospira icterohaemorrhagiae* (mouse, rat, dog, and human strains) was infective to guinea pigs, it also produced a fatal spirochetal infection in several species and subspecies of American rodents. (See tables 1, 2, 3, 4, and 5.)

While the number of animals of some species used in this work has been small, it appears that the susceptibility of a given species to *Leptospira icterohaemorrhagiae* is relatively constant, although individual variations within a given species were also noted. However, when large numbers of animals of a given species, such as albino *Peromyscus maniculatus gambelii*, were inoculated with a virulent strain of *Leptospira*, such variation did not seriously interfere with the experiments and general conclusions appear justified from the results.

It must be borne in mind that when the strains of *Leptospira icterohaemorrhagiae* are kept *in vitro* for a certain period, or kept in unfavorable conditions, they may partly or completely lose their pathogenicity not only for guinea pigs but also for susceptible American rodents.

The demonstration of *Leptospira* in the peripheral blood was relatively easier in the following species of animals, based on over 200 animal inoculations of each species (all cage-bred animals): *Peromyscus maniculatus gambelii* (albino), *Peromyscus eremicus eremicus*, *Peromyscus polionotus polionotus*. *Leptospira* were also seen in the blood of animals representing 24 species and subspecies of rodents; the number of animals used was small, from 1 to about 30 of each species being inoculated. All died within about a week, proving their susceptibility to the infection. In addition, 4 species of rodents died within 10 days, but no *Leptospira* were seen in the blood during the short fatal course of illness. The jaundice and internal hemorrhages suggested that these last 4 species likewise died of leptospirosis.

Four species of rodents, i. e., *P. floridanus floridanus*, *P. gossypinus gossypinus*, *P. leucopus noveboracensis*, and *Reithrodontomys*, appeared to have resistance to most strains of *Leptospira* and some recoveries occurred in all 4 species. It is striking that most individuals of these species, particularly *P. leucopus noveboracensis*, when dead from this disease showed very pronounced jaundice in the toes, yet few or no *Leptospira* were found in their blood by microscopic search. These 4 species of rodents appeared to be less suitable as susceptible experimental animals, because of the lack of uniformity in results.

The degree of jaundice, both internal and external, was found to vary not only among different species, but also among the individuals of the same species, even though they were given the same inoculum representing a given strain of *Leptospira icterohaemorrhagiae*. Likewise, it was noted that in any species of rodents a single strain of organisms produced more intense jaundice at one time than at another. The jaundice as a whole is more readily detectable in albino deer mice (*Peromyscus maniculatus gambelii*) in which this condition is of diagnostic significance.

The species of rodents which are highly susceptible to *Leptospira* and die within 10 days are unlikely to represent important reservoirs for *Leptospira icterohaemorrhagiae* because of the short period of illness and fatal outcome. Such animals are suitable for experimental studies of icterohemorrhagic spirochetosis and for diagnosis of Weil's disease. On the other hand, species such as *Mus musculus* and *Rattus norvegicus*, which survive infection and become chronic carriers of the leptospirochetes, continue to represent important reservoirs of infection (*4*, *8*).

FIGURE 1.—(a) Regular laboratory white mouse, *Mus musculus*, highly resistant to *Leptospira icterohaemorrhagiae*. (b) Albino deer mouse, *Peromyscus maniculatus gambelii*, highly susceptible to *Leptospira icterohaemorrhagiae*. (Note large eyes of deer mice.)

FIGURE 2.—(a) Hairless house mouse, *Mus musculus*, highly resistant to *Leptospira icterohaemorrhagiae* (carrier of disease). (b) Hairless deer mouse, *Peromyscus maniculatus*, highly susceptible to *Leptospira icterohaemorrhagiae*.

FIGURE 3.—Adult mice (a) Harvest mouse, *Reithrodontomys fulvescens fulvescens* (b) Forest deer mouse *Peromyscus leucopus noveboracensis* (c) Cotton mouse, *Peromyscus gossypinus gossypinus* All have resistance to *Leptospira icterohaemorrhagiae*

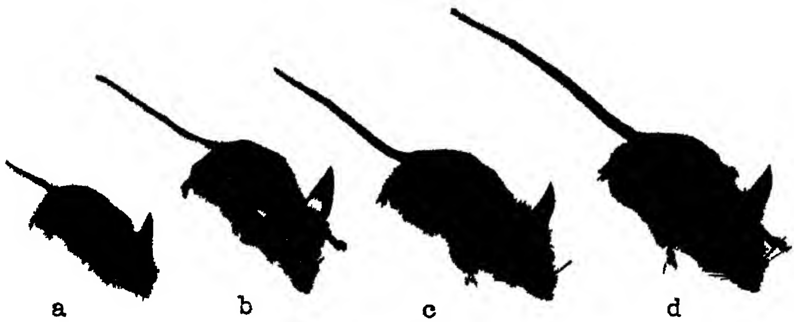

FIGURE 4.—(a) Old field mouse, adult, *Peromyscus polionotus polionotus* (b) True white-footed deer mouse *Peromyscus truei truei*, about 4 months old (c) Desert deer mouse, adult, *Peromyscus eremicus eremicus* (d) Parasitic deer mouse *Peromyscus californicus californicus*, about 3 months old All are susceptible to *Leptospira icterohaemorrhagiae*

FIGURE 5.—Adult rats (a) Baird wood rat, *Neotoma albigula albigula*, susceptible to *Leptospira icterohaemorrhagiae* (b) Laboratory white rat, *Rattus norvegicus*, highly resistant to *Leptospira icterohaemorrhagiae* Common house wild rat, *Rattus norvegicus*, has high resistance and is a carrier of *Leptospira icterohaemorrhagiae*.

When an animal is infected with *Leptospira icterohaemorrhagiae*, it will eliminate in the urine *Leptospira* which may be virulent (see table 4). The writer also found laboratory white mice (*Mus musculus*) infected naturally with both *Leptospira icterohaemorrhagiae* and *Spirochaeta morsus muris* during 1933 at St. Louis, Mo., and during 1937 at Washington, D. C. (*6*). The animal farm engaged in rearing white mice (*Mus musculus*) or white rats (*Rattus norvegicus*) should take every precaution that "wild" *Mus musculus* or *Rattus norvegicus* do not come in contact, directly or indirectly, with the stock animals; otherwise, some or all of the mice and rats may contract the infection and thus become carriers of the disease.

The most suitable animal for diagnosis of Weil's disease and for experimental studies of icterohemorrhagic spirochetosis is the albino *Peromyscus maniculatus*. Other rodents which are of value include *P. polionotus*, when a very small animal is desired; *P. eremicus* or *P. truei*, when a medium-sized experimental animal is needed; and *P. californicus*, *Neotoma micropus micropus*, or *Neotoma albigula albigula*, when a larger animal is needed. The breeding stock of *Neotoma* is not established as yet in captivity, while the other species in captivity are prolific.

SUMMARY

1. Thirty-two species and subspecies of rodents were inoculated with virulent strains of *Leptospira icterohaemorrhagiae*. Of this number, 26 species and subspecies were found to be susceptible, while the remaining 6 species were resistant to the experimental infection.

2. *Leptospira icterohaemorrhagiae* were demonstrable in the circulating blood of the susceptible animals 1 to 5 days following intraperitoneal inoculation; their number increased, and at the height of infection from 5 to over 100 *Leptospira* were demonstrable per microscopic field. The infection in these rodents ran an acute course and usually terminated fatally in from 3 to 15 days. Two or 3 days before death of the animals external jaundice, particularly of the ears, toes, and feet was, as a rule, a constant feature. At autopsy marked internal hemorrhages and jaundice were noted in these rodents.

3. Among the individuals of some species susceptible to the disease a few recoveries occurred. The blood serum of these recovered animals agglutinated freshly prepared formalinized antigen of *Leptospira icterohaemorrhagiae*. The agglutination reaction was prompt and clear cut.

4. It is suggested that *Peromyscus californicus californicus*, *P. eremicus eremicus*, *P. maniculatus gambelii* (albino), *P. polionotus*

polionotus, and *P. truei truei* are suitable as susceptible small laboratory animals for experimental studies of icterohemorrhagic spirochetosis and for the diagnosis of Weil's disease.

REFERENCES

(*1*) Osgood, W. H.: Revision of the mice of the American Genus *Peromyscus*. U. S. Department of Agriculture, Bureau of Biol. Survey, N. A. Fauna No. 28, U. S. Government Printing Office, Washington, D. C. (1909).
(*2*) Packchanian, A.: Experimental *Trypanosoma brucei* infection and immunity in various species of *Peromyscus*. Am. J. Hyg., **20:** 135 (1934).
(*3*) Packchanian, A.: A method of maintaining laboratory strains of *Trypanosoma brucei* in a subspecies of *Peromyscus maniculatus*. J. Lab. and Clin. Med., **20:** 510 (1935).
(*4*) Packchanian, A.: The occurrence of *Leptospira icterohaemorrhagiae* and *Spirochaeta morsus muris* in "laboratory white mice" *Mus musculus* at St. Louis (1933) and extreme susceptibility and fatality of American deer mice (*Peromyscus*) to *Leptospira icterohaemorrhagiae*. Science N. S., **83:** 140 (1936). (Published by title.)
(*5*) Packchanian, A.: La spirochétose ictérohémorragique (maladie de Weil) aux États-Unis. Bull. Office Internat. d'hyg. pub., **29:** 2350 (1937).
(*6*) Packchanian, A.: The prevalence of infectious jaundice in the United States as determined by agglutination and animal inoculation tests. Am. J. Path., **14:** 638 (1938).
(*7*) Packchanian, A.: Susceptibility and resistance of various species of *Peromyscus* (American deer mice) to infection with *Trypanosoma hippicum* and the possibility of certain "wild mice" being reservoir hosts to pathogenic trypanosomes. Am. J. Trop. Med., **18:** 587 (1938).
(*8*) Ridlon, J. R.: Studies on *Leptospira icterohaemorrhagiae*. Pub. Health Rep., **46:** 1 (1931).
(*9*) Sumner, F. B.: Genetic, distributional and evolutionary studies of the subspecies of deer mice (*Peromyscus*). Biology Genetica, **9:** 1 (1932).
(*10*) Walch-Sorgdrager, B., Schüffner, W., and Bohlander, H.: Der Einfluss des Säuregrades auf die Seroreaktion und das Wachstum der Leptospiren, sowie Bemerkungen über das Formalinreagens. Zeit. für Immunitätsforsch., **92:** 35 (1938).

DISABLING MORBIDITY AMONG MALE AND FEMALE INDUSTRIAL WORKERS DURING 1938 AND 1939, AND AMONG MALES DURING THE FIRST QUARTER OF 1940, WITH AN INQUIRY INTO THE OCCURRENCE OF MULTIPLE ATTACKS OF DISABLING SICKNESS AND INJURIES, 1939 [1]

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The quarterly reports for the year 1939 on the frequency of sickness and nonindustrial injuries causing disability for 8 consecutive calendar days or longer among a group of over 170,000 male members of 26 industrial sick benefit organizations have already appeared (*1–4*). The present report records the experience among both males and females for the years 1938 and 1939,[2] and among males for the first quarter of 1940; there is a concluding note on the frequency of occurrence of multiple attacks of disabling sickness and injuries experienced during 1939.

[1] From the Division of Industrial Hygiene, National Institute of Health. For the fourth quarter of 1939 see reference (*4*); the reader is referred also to (*5*).

[2] The last report of this series referring to the experience among females appeared in 1938 (*6*)

The years 1938 and 1939.—An inspection of table 1 with respect to the experience of the males shows that while the frequency of sickness and nonindustrial injuries for 1939 does not compare unfavorably with the corresponding frequency for either 1934–38 or 1938, the group of respiratory diseases yields a frequency almost 30 percent greater in 1939 than in 1938. This increase reflects primarily the rate for influenza and grippe which is seen to be 16.6 per 1,000 males in 1939 and 9.9 per 1,000 in 1938, the rate for 1939 being, however, less than one-half of the rate for the year 1937.

TABLE 1.—*Frequency of cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among male and female employees in various industries, by cause, experience of 1938 and 1939, and of the 5 years, 1934–38*

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1929)	Annual number of cases per 1,000 persons					
	Males			Females		
	1939	1934–38[1]	1938	1939	1934–38[1]	1938
Sickness and nonindustrial injuries[2]	89.0	87.1	82.3	150.0	143.0	130.4
Percent of female rate	*59*	*61*	*63*			
Percent of male rate				*169*	*164*	*158*
Nonindustrial injuries (163–198, 201–214)	10.3	11.6	11.1	13.0	12.9	14.5
Sickness[2]	78.7	75.5	71.2	137.0	130.1	115.9
Respiratory diseases	33.9	30.9	26.4	63.9	55.5	45.3
Influenza and grippe (11)	16.6	13.9	9.9	29.9	21.0	10.1
Bronchitis, acute and chronic (106)	4.1	4.1	4.2	7.3	7.2	6.7
Diseases of the pharynx and tonsils (115a)	4.4	4.8	4.5	11.6	12.5	10.5
Pneumonia, all forms (107–109)	3.0	2.4	2.2	2.0	1.5	2.1
Tuberculosis of the respiratory system (23)	.7	.9	.9	.9	.8	.7
Other respiratory diseases (104, 105, 110–114)	5.1	4.8	4.7	12.2	8.9	9.2
Nonrespiratory diseases	42.8	42.4	42.8	68.4	70.2	66.6
Digestive diseases	13.4	13.3	13.4	21.5	23.3	22.4
Diseases of the stomach, except cancer (117, 118)	3.5	3.7	4.1	2.2	2.8	2.7
Diarrhea and enteritis (120)	1.2	1.2	.9	1.6	2.6	2.3
Appendicitis (121)	4.3	4.1	3.9	11.9	11.4	10.4
Hernia (122a)	1.5	1.6	1.7	.5	.4	.5
Other digestive diseases (115b, 116, 122b–129)	2.9	2.7	2.8	5.3	6.1	6.5
Nondigestive diseases	29.4	29.1	29.4	46.9	46.9	44.2
Diseases of the heart (90–95)	2.9	2.4	2.6	1.8	1.5	1.4
Other circulatory diseases (96–103)	3.5	2.9	3.3	3.2	3.0	3.7
Nephritis, acute and chronic (130–132)	.4	.5	.5	.5	.3	.3
Other genitourinary diseases (133–139)	2.3	2.4	2.4	9.5	10.0	8.9
Neuralgia, neuritis, sciatica (87a)	2.2	2.1	2.1	2.1	2.3	1.2
Neurasthenia and the like (part of 87b)	.9	1.0	1.0	5.7	5.9	5.5
Other diseases of the nervous system (78–85, part of 87b)	1.1	1.2	1.2	1.2	1.0	.6
Rheumatism, acute and chronic (56, 57)	3.5	4.0	3.7	2.4	3.3	3.6
Diseases of the organs of locomotion, except diseases of the joints (156b)	2.6	2.9	2.8	1.4	1.8	1.5
Diseases of the skin (151–153)	2.7	2.9	3.0	3.3	3.2	2.3
Infectious and parasitic diseases[3] (1–10, 12–22, 24–33, 36–44)	2.1	2.5	2.1	2.3	3.7	3.6
Cancer, all sites (45–53)	.6	.5	.6	.5	.4	.6
All other diseases (54, 55, 58–77, 88, 89, 140–150, 154–156a, 157, 162)	4.6	3.8	4.1	13.0	10.5	11.0
Ill-defined and unknown causes (200)	2.0	2.2	2.0	4.7	4.4	4.0
Number of person-years, all reporting organizations	188,595	882,654	178,405	15,343	77,998	15,203
Number of organizations	29		29	24		24

[1] Average of the 5 annual rates.
[2] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[3] Except influenza, respiratory tuberculosis, and the venereal diseases.

The experience of the females, on the other hand, shows an increase of about 15 percent in the frequency of sickness and nonindustrial injuries when 1939 is compared with 1938, while a comparison of 1939 with the average for 1934–38 shows only a slight increase. As in the instance of the males the former increase is largely accounted for by influenza and grippe, the rate for 1939 being 29.9 and for 1938, 16.1.

It will be observed that while the total frequency, for either year or the 5-year period, is approximately 60 percent greater among the females than among the males there are certain causes and cause groups that show for each of the three time periods lower rates among the females; these are pneumonia (all forms), diseases of the stomach except cancer, hernia, diseases of the heart, and rheumatism.[3]

First quarter of the year 1940.—The morbidity experience among the male members of 26 industrial sick benefit organizations for the first quarter of 1940 as compared with the corresponding quarters of 1939 and 1938 is shown in table 2. An examination of this table reveals the corresponding first quarter rates for the subgroups of the nonrespiratory diseases to be remarkably similar. The situation is different, however, with respect to the respiratory group in that the experience for 1940 is more similar to the experience of 1939 than to that of 1938. A review of the first quarter rates for the 10 years, 1931–40, reveals that the 1940 rate (69.8) for the respiratory group of diseases is exceeded only by those for 1937 (87.5) and 1931 (75.2).

Of interest is the relatively high rate (12.4) for nonindustrial injuries. The available data on the frequency of nonindustrial injuries by quarter years extend back to 1928 and yield for the 13 years, 1928–40, an average first quarter rate of 10.9, the maximum first quarter rate occurring in 1940 and the minimum (9.6) in the year immediately preceding. Previous to 1940 the highest rate attained was that of 11.9 in 1929.

Distribution of the occurrence of multiple attacks of disabling sickness and injuries, 1939.—The following question frequently arises: Given a population of industrial workers and a period of time, how many of the workers suffered no attacks, 1 attack, 2 attacks, etc.? The requisite data on sickness and injuries that were reported as having caused incapacitation for work for 1 calendar day or longer during 1939 among the 2,738 male workers of a public utility are available for an examination of the subject proposed. The number of disabilities totaled 2,816, of which 2,629 are accounted for by sickness, 139 by nonindustrial injuries, and 48 by industrial injuries.

[3] Summation of neuralgia, neuritis, and sciatica, rheumatism, acute and chronic; and diseases of the organs of locomotion except diseases of the joints

TABLE 2.—*Frequency of cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among MALE employees in various industries, by cause, the first quarter of 1940 compared with the first quarters of 1939 and 1938* [1]

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of cases per 1,000 men for the first quarter		
	1940	1939	1938
Sickness and nonindustrial injuries [2]	132.3	127.3	99.1
Nonindustrial injuries (163–198)	12.4	9.6	10.8
Sickness [2]	119.9	115.7	88.3
Respiratory diseases	69.8	65.9	39.1
Influenza and grippe (33)	39.6	30.9	16.8
Bronchitis, acute and chronic (106)	8.7	6.6	6.2
Diseases of the pharynx and tonsils (part of 115)	6.1	5.7	5.5
Pneumonia, all forms (107–109)	6.1	4.7	3.1
Tuberculosis of the respiratory system (13)	.5	.8	.9
Other respiratory diseases (104, 105, 110–114)	8.8	8.2	6.6
Nonrespiratory diseases	47.9	47.4	46.9
Digestive diseases	14.5	14.2	13.5
Diseases of the stomach, except cancer (117, 118)	3.7	3.6	3.9
Diarrhea and enteritis (120)	1.4	1.1	.7
Appendicitis (121)	5.2	4.5	4.3
Hernia (part of 122)	1.3	1.4	1.9
Other digestive diseases (part of 115, 116, part of 122, 123–129)	2.9	3.6	2.7
Nondigestive diseases	33.4	33.2	33.4
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.8	5.3	4.8
Other genitourinary diseases (133–138)	2.9	2.3	2.7
Neuralgia, neuritis, sciatica (part of 87)	2.8	2.3	2.7
Neurasthenia and the like (part of 87)	1.1	1.0	.9
Other diseases of the nervous system (80–86, part of 87)	1.1	1.1	1.5
Rheumatism, acute and chronic (58, 59)	4.3	4.5	4.4
Diseases of the organs of locomotion, except diseases of the joints (part of 156)	3.4	3.1	2.8
Diseases of the skin (151–153)	3.1	2.7	3.0
Infectious and parasitic diseases [3] (1–12, 14–24, 26–29, 31, 32, 34–44)	2.2	3.0	2.8
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, part of 156, 157, 162)	7.7	7.9	7.8
Ill-defined and unknown causes (200)	2.2	2.4	2.3
Average number of males covered in the record	194,034	170,649	172,257
Number of organizations	26	26	26

1 The same 26 organizations are included in 1940, 1939, and 1938.
2 Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
3 Except influenza, respiratory tuberculosis, and the venereal diseases.

NOTE.—Title numbers from the International List of the Causes of Death, 1939, are given in this table. For some diseases and disease groups the numbers are not the same as shown in previous tables where the edition of 1929 was used, but the disease classification is unchanged.

The results of the analysis are shown in table 3 according to the 4 groups of causes: Sickness and injuries, sickness, nonindustrial injuries, and industrial injuries. It will be observed that of the total group of workers 42 percent had during the year neither disabling sicknesses nor disabling injuries, 45 percent had no disabling sicknesses, 95 percent had no disabling nonindustrial injuries, and 98 percent had no industrial injuries.

Of particular interest are the percentage distributions with respect to sicknesses and injuries, and sicknesses. According to the table the population exposed is in each instance sufficiently large to show for the number of attacks varying from 1 through 6 that the percentage rate of decrease of the different percentages is approximately constant.

TABLE 3.—*Distribution of the occurrence of multiple attacks of disabling sickness and injuries, experience of 2,738 male workers of a public utility, 1939*

Number of attacks during 1939 disabling for one calendar day or longer	Workers suffering the indicated number of attacks: Percent				Number			
	2,816 sicknesses and injuries	2,629 sicknesses	139 nonindustrial injuries	48 industrial injuries	2,816 sicknesses and injuries	2,629 sicknesses	139 nonindustrial injuries	48 industrial injuries
None, or one or more	100.0	100.0	100.0	100.0	2,738	2,738	2,738	2,738
None	42.4	44.8	95.4	98.3	1,160	1,227	2,613	2,692
One or more	57.6	55.2	4.6	1.7	1,578	1,511	125	46
1	31.6	31.5	4.1	1.6	866	863	113	44
2	14.3	13.0	.4	.1	392	355	10	2
3	7.2	6.7	.1	0	197	183	2	0
4	2.9	2.5	0	0	78	70	0	0
5	.9	.9	0	0	25	24	0	0
6	.5	.4	0	0	13	11	0	0
7	.1	.1	0	0	3	2	0	0
8	.1	.1	0	0	2	2	0	0
9	(1)	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0
11	0	(1)	0	0	0	1	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	(1)	0	0	0	1	0	0	0

[1] Less than 0.05 percent.

REFERENCES

(*1*) Gafafer, W. M.: Disabling morbidity among industrial workers, first quarter of 1939. Pub. Health Rep., **54**: 1554–1556 (Aug. 25, 1939).

(*2*) ————: Disabling morbidity among industrial workers, second quarter and first half of 1939. Pub. Health Rep., **54**: 1878–1880 (October 20, 1939).

(*3*) ————: Disabling morbidity among industrial workers, third quarter and the first 9 months of 1939. Pub. Health Rep., **55**: 1–3 (Jan. 5, 1940).

(*4*) ————: Disabling morbidity among industrial workers, final quarter of 1939 and the entire year. Pub. Health Rep., **55**: 650–652 (April 12, 1940).

(*5*) ————: The course of disabling morbidity among industrial workers, 1921–38. Pub. Health Rep., **55**: 962–974 (May 31, 1940). With minor changes in: Indust. Med., **9**: 55–61 (February 1940).

(*6*) Gafafer, W. M., and Frasier, Elizabeth S.: Frequency of disabling illness among industrial employees during 1932–37 and the first quarter of 1938. Pub. Health Rep., **53**: 1562–1571 (Sept. 2, 1938).

STUDIES IN CHRONIC SELENOSIS

A REVIEW

This Bulletin [1] presents the results of a series of investigations on the effects of continued ingestion of naturally occurring food selenium in amounts and quantities such as man and farm animals are exposed to in selenium-endemic areas in several of the Great Plains States. The material in the Bulletin is treated under four headings:

Part I. The chronic toxicity of naturally occurring food selenium.

Part II. Gastric acidity in chronic selenium poisoning.

Part III. Liver function and bile pigments in experimental chronic selenium poisoning.

Part IV. Selenium in the hair as an index of the extent of its deposition in the tissues in chronic poisoning.

[1] Studies in chronic selenosis. By M. I. Smith, R. D. Lillie, E. F. Stohlman, and B. B. Westfall. National Institute of Health Bulletin No. 174. U. S. Government Printing Office, Washington, D. C. Price 15 cents.

The data in Part I are summarized as follows: "Data are presented showing the systematic effects and morphologic changes in the tissues of animals fed graded doses of naturally occurring food selenium over periods extending up to about 1 year. The results indicate that food selenium is somewhat less toxic than the inorganic sodium selenite or selenate. Doses in excess of 1 mg. per kg. per day are dangerously toxic. Doses up to 0.5 mg. per kg. per day may be tolerated under favorable nutritional conditions without causing serious symptoms or pronounced tissue damage, though doses as small as 0.2 mg. per kg. per day may cause symptoms of systemic poisoning characterized by liver injury and damage to the gastric mucosa."

In Part II the results of experiments on gastric acidity, free HCl, and total acidity in chronically poisoned experimental animals are given. The data indicate that marked or constant diminution in free or total gastric acidity is not an essential feature in chronic selenium poisoning. Gastric analysis would appear to be of little help in the diagnosis of chronic selenium poisoning in man.

In Part III the methods employed and results obtained on urinary urobilinogen, plasma bilirubin, and four different types of tests employed in measuring liver function in chronically poisoned animals are given. It is shown that no marked abnormalities in the bile pigment metabolism may be expected in the mild forms of poisoning, but that impairment of liver function is demonstrable when no other symptoms are apparent. Of the four tests employed, viz, (1) the conjugation of hippuric acid from intravenously injected sodium benzoate, (2) the removal of intravenously injected bromsulphalein, (3) the removal of intravenously injected bilirubin, and (4) the removal of intravenously injected rose bengal (di-sodium-tetrachlor-tetraiodo-fluorescein), the last is the most sensitive and most specific test for this type of interstitial hepatitis.

In Part IV the method in use for the determination of small amounts of selenium in biological material is described in detail. Data are also presented on the concentration of selenium in the hair in relation to that in various tissues and body fluids, and it is pointed out that analysis of the hair for selenium may serve as an index of the amount of selenium stored in the body and of the length of time an individual has been exposed to it just as an analysis of the urine for selenium serves to indicate the probable daily absorption of this element.

COURT DECISION ON PUBLIC HEALTH

Statute regarding employment of county health personnel construed.—(New Mexico Supreme Court; *Board of Com'rs of Colfax County et al.* v. *Department of Public Health et al.*, 100 P.2d 222; decided March 15,

1940.) A section of the statutes of New Mexico provided that whenever, in the opinion of the State director of public health, conditions required the employment of persons in addition to the county health officer to execute properly the health laws, rules, and regulations in any county, "the board of county commissioners of such county, with the approval of the director of public health may employ such additional persons as the director of public health shall designate, and their compensation and expenses shall be paid from the 'county health fund' upon vouchers drawn by the county health officer." In a suit for a declaratory judgment the question presented was whether the board of county commissioners or the State director of public health had the power to discharge an employee who had been regularly employed under the said law.

With respect to the word "employ" as used in the statute, the supreme court said that it was unquestionably synonymous with "hire" or "appoint" and did not mean "to make use of." As to where the employing power or the power to appoint resided, it was held by the court to be in the board of county commissioners and that the power to remove, being an incident to the power to appoint, rested in the board alone.

The court stated that the act vested in the State director of public health two separate and distinct powers in the matter of employees hired by the board. One was the power to approve or disapprove the person employed by the board, and the other was the power to designate the place to be filled by the board, as, for example, nurse, stenographer, etc. "However," said the court, "once an employee has been appointed to fill a place which has been designated by the director as necessary to be filled, such appointee having been approved by the director, the right to discharge such employee is with the board and not the director."

DEATHS DURING WEEK ENDED JULY 20, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 20, 1940	Corresponding week, 1939
Data from 87 large cities of the United States:		
Total deaths	7,461	[1] 7,212
Average for 3 prior years	7,280	
Total deaths, first 29 weeks of year	252,868	250,494
Deaths under 1 year of age	473	[1] 456
Average for 3 prior years	522	
Deaths under 1 year of age, first 29 weeks of year	14,524	14,883
Data from industrial insurance companies:		
Policies in force	65,106,173	66,974,598
Number of death claims	10,834	10,937
Death claims per 1,000 policies in force, annual rate	8.7	8.5
Death claims per 1,000 policies, first 29 weeks of year, annual rate	10.1	10.8

[1] Data for 88 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 27, 1940

Summary

The week ended July 27, 1940, shows slight increased incidence for diphtheria, influenza, poliomyelitis, typhoid fever, and whooping cough and decreases for measles, meningococcus meningitis, scarlet fever, and smallpox as compared with the preceding week. Of these diseases, only influenza and measles were higher than the 5-year (1935–39) median expectancy, and the cumulative figures for the current year to date are higher than the 5-year median only for influenza.

Only 21 cases of smallpox were reported for the current week, with only 8 States reporting any cases. No cases were reported in the New England, Middle Atlantic, South Atlantic, East North Central, and West Central groups of States. Of 136 cases of poliomyelitis, 18 cases each were reported in California and Washington State, 13 cases in Indiana, and 10 cases in Texas. The remaining cases were scattered with no one State reporting more than 8 cases. Of 385 cases of typhoid fever, 38 cases occurred in Georgia, 30 in Missouri, and 137 in the 4 West South Central States, 43 of which were reported in Texas. Of 28 cases of Rocky Mountain spotted fever, 24 occurred in the eastern States and only 4 cases in the Rocky Mountain area. Seventy-one cases of endemic typhus fever were reported, of which 21 were in Georgia and 19 in Texas.

The following table shows the deaths in large cities during July 1940 and comparison with the corresponding week of 1939 and the 3-year (1937–39) average. The excess deaths due to high temperatures are probably indicated by the figures for the current week and the 3-year average for the week of July 13.

	Week ended—			
	July 6	July 13	July 20	July 27
1940	7,116	7,872	7,461	8,855
1939	7,206	7,552	7,198	7,218
3-year (1937–39) average	7,394	8,126	7,280	7,193

Telegraphic morbidity reports from State health officers for the week ended July 27, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939	
NEW ENG.												
Maine	0	0	0	------	------	------	44	23	23	0	0	0
New Hampshire	0	0	0	------	------	------	0	6	2	0	0	0
Vermont	2	0	0	------	------	------	9	38	12	0	0	0
Massachusetts	1	1	6	------	------	------	391	106	105	1	0	2
Rhode Island	0	0	0	------	------	------	31	27	6	0	0	0
Connecticut	1	2	3	2	------	------	16	46	32	0	0	0
MID. ATL.												
New York	10	8	16	[1] 4	[1] 3	[1] 2	561	278	354	2	1	5
New Jersey [2]	6	6	7	------	1	1	290	18	125	0	0	2
Pennsylvania	8	15	13	------	------	------	170	45	234	2	7	6
E. NO. CEN.												
Ohio [1]	4	4	22	2	5	5	21	20	106	0	0	1
Indiana	11	0	9	3	2	8	12	1	8	1	0	2
Illinois	17	16	21	6	6	6	104	10	36	1	0	4
Michigan [3]	0	7	8	------	1	------	366	73	128	1	1	1
Wisconsin	1	0	0	6	9	19	356	73	73	0	0	0
W. NO. CEN.												
Minnesota	0	0	0	1	1	1	13	19	19	0	0	0
Iowa [3]	2	0	4	------	------	------	28	20	15	1	0	0
Missouri	2	1	5	------	------	13	8	1	8	2	1	0
North Dakota	18	4	0	------	------	------	3	0	4	1	0	0
South Dakota	0	4	1	------	------	------	4	1	1	0	0	0
Nebraska	0	1	1	------	------	------	8	3	5	0	0	0
Kansas	1	1	3	4	3	2	33	13	13	1	1	1
SO. ATL.												
Delaware	0	0	0	------	------	------	2	3	2	0	1	0
Maryland [2 3 4]	1	2	8	------	3	1	2	11	11	0	0	0
Dist. of Col. [2]	2	5	4	------	------	------	2	9	6	1	1	1
Virginia [2]	3	20	5	25	27	------	35	57	57	1	1	2
West Virginia [3]	1	4	4	5	3	9	7	4	19	3	2	2
North Carolina [2 4]	8	21	14	------	------	1	21	27	27	0	0	0
South Carolina [4]	4	3	3	87	69	40	2	------	2	1	1	0
Georgia [2 4]	8	15	10	21	7	------	4	7	------	0	0	0
Florida [4]	1	4	4	1	2	------	1	11	1	0	0	0
E. SO. CEN.												
Kentucky	1	8	5	------	2	2	40	4	27	0	1	3
Tennessee	1	3	5	13	7	7	17	16	8	0	1	1
Alabama [4]	4	12	12	3	3	3	51	18	12	0	4	2
Mississippi [3]	2	16	11	------	------	------	------	------	------	0	0	0
W. SO. CEN.												
Arkansas	1	3	3	23	4	5	1	19	2	0	0	0
Louisiana [4]	4	6	9	2	6	6	3	3	4	0	0	0
Oklahoma	2	3	3	8	7	7	8	13	5	0	0	0
Texas [4]	19	11	22	183	9	23	90	37	34	1	5	2
MOUNTAIN												
Montana	0	0	0	------	------	------	11	16	15	0	0	0
Idaho	0	1	1	------	------	2	4	1	4	0	0	0
Wyoming [2]	0	2	0	------	1	------	5	18	5	0	0	0
Colorado [2 5]	10	16	6	2	5	------	10	14	14	0	1	1
New Mexico [2]	0	3	3	------	------	------	16	1	2	0	0	0
Arizona	0	0	1	23	8	10	36	1	5	0	0	0
Utah [3]	0	3	0	------	------	------	31	12	12	0	0	0
PACIFIC												
Washington	3	1	1	------	------	------	11	168	52	0	0	0
Oregon	1	0	0	1	8	8	33	74	15	1	0	0
California [4]	19	16	19	11	7	10	88	177	177	4	0	5
Total	179	248	286	436	209	251	2,999	1,542	2,170	31	29	67
30 weeks	8,371	11,127	13,410	167,969	150,757	141,130	223,674	345,945	345,945	1,056	1,288	3,946

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 27, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939		July 27, 1940	July 29, 1939	
NEW ENG.												
Maine	0	0	0	2	4	5	0	0	0	6	1	1
New Hampshire	0	0	0	1	0	1	0	0	0	0	1	1
Vermont	0	0	0	0	2	4	0	0	0	0	0	0
Massachusetts	0	2	3	30	22	32	0	0	0	1	3	3
Rhode Island	0	0	0	0	0	2	0	0	0	0	1	1
Connecticut	0	1	1	6	9	10	0	0	0	1	4	3
MID. ATL.												
New York	3	11	11	92	72	93	0	0	0	4	10	12
New Jersey [2]	3	3	3	50	23	16	0	0	0	5	10	2
Pennsylvania	0	4	4	76	72	72	0	0	0	8	9	15
E. NO. CEN.												
Ohio [2]	7	3	5	38	55	65	0	5	1	6	14	14
Indiana	13	0	2	17	21	21	0	7	6	6	4	8
Illinois	4	7	7	87	64	80	0	1	4	7	23	19
Michigan [3]	7	29	8	50	69	76	0	10	1	7	2	5
Wisconsin	1	0	0	36	31	56	0	1	1	0	0	1
W. NO. CEN.												
Minnesota	0	4	0	12	50	29	6	4	4	2	2	0
Iowa [3]	2	0	1	5	13	19	3	7	7	1	10	4
Missouri	0	3	1	18	6	13	0	4	4	30	14	15
North Dakota	0	1	0	1	2	6	1	1	1	0	0	1
South Dakota	1	0	0	1	8	6	1	1	1	0	0	0
Nebraska	0	2	0	1	3	10	0	5	0	0	0	0
Kansas	8	8	2	15	23	23	0	0	0	5	6	6
SO. ATL.												
Delaware	0	0	0	2	5	1	0	0	0	0	0	0
Maryland [2 3 4]	0	0	0	5	10	12	0	0	0	1	5	6
Dist. of Col. [2]	0	0	0	4	3	5	0	0	0	0	2	2
Virginia [2]	3	3	4	13	11	11	0	0	0	7	23	36
West Virginia [3]	6	0	0	7	10	13	0	0	0	11	20	12
North Carolina [2 4]	1	8	6	5	15	15	0	0	0	6	21	21
South Carolina [4]	0	12	2	6	8	2	0	0	0	11	24	16
Georgia [2 4]	1	5	2	7	3	6	0	0	0	38	39	35
Florida [4]	1	2	1	0	5	1	0	0	0	1	3	2
E. SO. CEN.												
Kentucky	0	4	4	5	11	11	0	1	0	21	37	37
Tennessee	0	2	6	12	10	10	2	0	0	9	17	38
Alabama [4]	2	2	4	11	17	10	1	0	0	9	25	20
Mississippi [3]	1	0	2	6	4	4	0	0	0	11	6	16
W. SO. CEN.												
Arkansas	0	1	1	1	8	4	0	2	2	36	30	30
Louisiana [4]	8	0	1	4	2	5	0	0	0	38	39	32
Oklahoma	6	3	0	13	6	7	0	2	0	20	26	33
Texas [4]	10	10	2	15	7	16	0	1	1	43	67	67
MOUNTAIN												
Montana	1	0	0	4	10	10	0	0	3	0	2	2
Idaho	3	0	0	2	1	2	0	0	2	1	1	1
Wyoming [2]	1	0	0	3	4	4	0	0	0	1	0	0
Colorado [2 5]	0	1	0	12	11	11	3	1	0	2	3	4
New Mexico [2]	1	0	0	2	8	4	0	0	0	7	6	6
Arizona	0	3	0	2	0	1	0	1	0	4	3	0
Utah [3]	2	1	0	4	4	5	0	0	0	1	2	1
PACIFIC												
Washington	18	0	0	15	9	13	0	2	4	4	1	3
Oregon	4	1	0	3	10	10	4	0	3	6	4	4
California [4]	18	46	21	45	52	62	0	11	9	8	14	13
Total	136	177	177	746	793	998	21	76	76	385	534	582
30 weeks	1,200	1,334	1,334	116,998	114,282	162,236	1,893	8,576	7,795	3,829	5,599	6,126

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 2[illegible], 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough — Week ended— July 27, 1940	Whooping cough — Week ended— July 29, 1939
NEW ENG.		
Maine	25	43
New Hampshire	0	2
Vermont	16	35
Massachusetts	126	81
Rhode Island	5	26
Connecticut	63	62
MID. ATL.		
New York	321	420
New Jersey [2]	114	254
Pennsylvania	322	364
E. NO. CEN.		
Ohio [2]	306	313
Indiana	16	115
Illinois	135	389
Michigan [3]	310	160
Wisconsin	106	212
W. NO. CEN.		
Minnesota	46	60
Iowa [2]	81	20
Missouri	51	32
North Dakota	7	27
South Dakota	5	1
Nebraska	16	24
Kansas	71	16
SO. ATL.		
Delaware	7	8
Maryland [2 3 4]	143	55
Dist. of Col. [2]	17	44
Virginia [2]	55	95
West Virginia [3]	63	13
North Carolina [2 4]	103	172
SO. ATL.—con.		
South Carolina [4]	19	58
Georgia [2 4]	11	10
Florida [4]	0	7
E. SO. CEN.		
Kentucky	78	58
Tennessee	65	95
Alabama [4]	23	40
Mississippi [3]	---------	---------
W. SO. CEN.		
Arkansas	23	28
Louisiana [4]	14	1
Oklahoma	17	8
Texas [4]	244	120
MOUNTAIN		
Montana	0	11
Idaho	11	0
Wyoming [2]	10	2
Colorado [2 5]	17	48
New Mexico [2]	26	31
Arizona	7	3
Utah [3]	78	52
PACIFIC		
Washington	36	15
Oregon	15	6
California [4]	297	133
Total	3,471	3,759
30 weeks	96,898	117,164

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended July 27, 1940, 28 cases as follows: New Jersey, 1; Ohio, 1; Iowa, 2; Maryland, 6; District of Columbia, 1; Virginia, 2; North Carolina, 8; Georgia, 3; Wyoming, 2; Colorado, 1; New Mexico, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended July 27, 1940, 71 cases as follows: Maryland, 1; North Carolina, 3; South Carolina, 3; Georgia, 21; Florida, 8; Alabama, 9; Louisiana, 6; Texas, 19; California, 1.
[5] Colorado tick fever, week ended July 27, 1940, Colorado, 1 case.

BUBONIC PLAGUE IN EMMETT, IDAHO

Under date of July 22, 1940, Dr. E. L. Berry, State director of public health of Idaho, reported bubonic plague diagnosed by Surg. L. B. Byington, of the Public Health Service Plague Suppressive Measures Laboratory in San Francisco, in a 13-year-old boy at Emmett, Gem County, Idaho. Onset of illness was on June 10, but the case was not immediately recognized as plague.

PLAGUE INFECTION IN FLEAS FROM GROUND SQUIRRELS IN SAN BERNARDINO COUNTY, CALIF.

Under date of July 15, 1940, Dr. Bertram P. Brown, State director of public health of California, reported plague infection proved in a pool of 38 fleas from 21 golden-mantled ground squirrels submitted to the laboratory on June 26 from a location 1 mile north of Fawnskin Resort, San Bernardino County, Calif.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 13, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	100	27	13	1,345	307	454	8	362	57	1,338	--------
Current week [1]	47	28	10	1,906	216	413	0	342	35	1,161	--------
Maine:											
Portland	0	------	0	6	1	0	0	1	0	4	24
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	6
Nashua	0	------	0	0	0	0	0	0	0	0	6
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	12
Rutland	0	------	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	1	------	0	111	11	0	0	12	0	46	189
Fall River	0	------	0	59	1	0	0	0	0	10	26
Springfield	0	------	0	6	0	0	0	0	0	3	36
Worcester	0	------	0	181	6	0	0	1	0	6	59
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	1	0	19
Providence	0	------	0	51	2	1	0	2	1	2	57
Connecticut:											
Bridgeport	0	------	0	3	2	1	0	1	0	2	25
Hartford	0	------	0	0	2	2	0	0	0	0	42
New Haven	0	------	1	0	2	1	0	4	0	1	57
New York:											
Buffalo	0	------	0	3	8	4	0	3	0	3	153
New York	14	2	0	350	30	94	0	88	1	125	1,385
Rochester	0	1	0	5	2	1	0	0	0	8	67
Syracuse	0	------	0	2	0	1	0	0	0	3	51
New Jersey:											
Camden	0	------	1	5	2	4	0	2	0	1	27
Newark	0	------	0	177	4	12	0	11	0	30	98
Trenton	0	------	0	2	3	2	0	2	1	5	42
Pennsylvania:											
Philadelphia	1	------	2	177	15	34	0	30	4	42	456
Pittsburgh	1	4	1	1	9	10	0	5	1	31	146
Reading	0	------	0	5	0	2	0	0	1	32	25
Scranton	0	------	--------	0	-------	0	0	-------	0	0	--------
Ohio:											
Cincinnati	0	------	0	0	2	5	0	9	0	7	121
Cleveland	0	5	0	1	8	14	0	7	0	69	174
Columbus	2	------	0	1	0	3	0	4	0	12	74
Toledo	0	------	0	2	2	9	0	3	0	12	78
Indiana:											
Anderson	0	------	0	0	0	0	0	1	0	0	10
Fort Wayne	0	------	0	1	0	1	0	0	0	4	32
Indianapolis	0	------	0	2	7	1	0	5	0	2	88
Muncie	0	------	0	0	3	0	0	0	0	2	14
South Bend	0	------	0	0	1	0	0	0	0	0	20
Terre Haute	0	------	0	0	1	0	0	0	0	0	19
Illinois:											
Alton	0	------	0	0	0	0	0	0	1	5	9
Chicago	8	3	2	137	12	97	0	22	3	11	659
Elgin	0	------	0	0	0	0	0	0	0	3	5
Moline	0	------	0	0	0	0	0	0	0	0	12
Springfied	0	------	0	0	2	0	0	1	0	3	21
Michigan:											
Detroit	2	------	0	178	3	30	0	16	1	159	226
Flint	0	------	0	4	0	0	0	0	0	7	13
Grand Rapids	0	------	0	22	0	6	0	0	1	49	32
Wisconsin:											
Kenosha	0	------	0	16	0	0	0	0	0	0	5
Madison	0	------	0	6	0	0	0	0	0	14	18
Milwaukee	0	------	0	252	1	13	0	4	0	8	108
Racine	0	------	0	3	0	3	0	0	0	0	9
Superior	0	------	0	7	0	1	0	1	0	0	6

[1] Figures for Barre and Boise estimated; reports not received.

City reports for week ended July 13, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0		0	3	0	0	0	0	0	1	21
Minneapolis	0		0	0	2	3	0	2	2	13	101
St. Paul	0		0	0	4	3	0	5	0	13	46
Iowa:											
Cedar Rapids	0			2		0	0		0	1	
Davenport	0			0		1	0		0	0	
Des Moines	0		0	3	0	0	0	0	0	0	26
Sioux City	0		0	0	0	0	0	1	0	4	
Waterloo	0			2		0	0		0	3	
Missouri:											
Kansas City	0		0	1	2	1	0	2	0	4	107
St. Joseph	0		0	0	3	0	0	0	0	0	29
St. Louis	1		0	4	5	5	0	13	2	22	147
North Dakota:											
Fargo	0		0	0	0	0	0	0	0	0	8
Grand Forks	0			0		0	0		0	2	
Minot	0		0	0	0	0	0	0	0	0	8
South Dakota:											
Aberdeen	0			0		0	0		0	0	
Sioux Falls	0		0	0	0	0	0	0	0	0	8
Nebraska:											
Lincoln	0			1		1	0		0	0	
Omaha	0		0	2	2	2	0	2	0	4	55
Kansas:											
Lawrence	0		1	0	0	0	0	0	0	0	7
Topeka	0		0	3	0	0	0	0	0	0	9
Wichita	0		0	3	0	0	0	0	0	5	27
Delaware:											
Wilmington	0		0	0	1	1	0	1	0	8	34
Maryland:											
Baltimore	0	1	1	1	4	4	0	10	0	118	188
Cumberland	0		0	0	0	0	0	0	1	0	10
Frederick	0		0	0	0	0	0	0	0	0	1
Dist. of Col.:											
Washington	5		0	1	3	8	0	9	0	13	160
Virginia:											
Lynchburg	0		0	0	3	0	0	0	0	3	13
Norfolk	1		0	1	1	1	0	2	3	7	26
Richmond	0		1	1	0	2	0	0	0	0	42
Roanoke	0		0	5	0	0	0	0	0	6	10
West Virginia:											
Charleston	0		0	0	1	1	0	0	0	1	5
Huntington	0			0		0	0		0	0	
Wheeling	0		0	0	0	0	0	0	1	1	22
North Carolina:											
Gastonia	0			0		0	0		0	0	
Raleigh	0		0	0	1	0	0	0	0	0	9
Wilmington	0		0	0	0	0	0	0	0	0	11
Winston-Salem	0		0	0	0	1	0	0	0	1	20
South Carolina:											
Charleston	0	2	0	0	2	0	0	1	0	0	15
Florence	0		0	0	1	0	0	0	0	0	12
Greenville	0		0	0	0	0	0	0	0	2	12
Georgia:											
Atlanta	0	1	0	0	2	3	0	5	1	5	81
Brunswick	0		0	0	0	0	0	0	0	0	3
Savannah	0	5	0	0	0	0	0	1	0	1	24
Florida:											
Miami	0		0	2	1	0	0	1	2	0	37
Tampa	2		0	2	1	0	0	0	0	0	22
Kentucky:											
Ashland	0		0	0	2	0	0	0	0	0	5
Covington	0		0	1	0	0	0	1	0	0	
Lexington	0		0	27	0	0	0	0	0	15	12
Tennessee:											
Knoxville	0		0	0	0	0	0	1	0	2	22
Memphis	0		0	8	3	0	0	0	0	13	68
Nashville	0		0	0	1	0	0	1	0	10	38
Alabama:											
Birmingham	0	1	0	5	1	2	0	2	0	3	56
Mobile	0		1	0	2	0	0	2	0	0	16
Montgomery	0			0		1	0		0	0	
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0		0	0	0	2	0	1	0	1	

City reports for week ended July 13, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0		0	0	1	0	0	0	1	0	6
New Orleans	1		0	1	7	6	0	8	7	56	120
Shreveport	0		0	1	0	0	0	2	1	0	34
Oklahoma:											
Oklahoma City	1		0	0	2	0	0	1	0	0	42
Tulsa	0		0	4	0	2	0	0	0	29	17
Texas:											
Dallas	0		0	17	1	0	0	2	4	13	73
Fort Worth	1		0	3	3	2	0	2	1	2	40
Galveston	0		0	0	1	0	0	0	0	0	17
Houston	1		0	3	5	1	0	2	0	6	69
San Antonio	0	1	0	0	0	4	0	0	0	8	57
Montana:											
Billings	0		0	0	1	0	0	0	0	0	7
Great Falls	0		0	14	1	0	0	1	1	0	12
Helena	0		0	0	0	0	0	0	0	0	1
Missoula	0		0	0	1	0	0	0	0	0	10
Idaho:											
Boise											
Colorado:											
Colorado Springs	0		0	0	0	1	0	1	0	0	6
Denver	5		0	3	2	3	0	4	1	1	60
Pueblo	0		0	3	1	1	0	0	0	0	7
New Mexico:											
Albuquerque	0		0	0	2	0	0	2	0	3	14
Utah:											
Salt Lake City	0		0	30	2	1	0	0	0	63	33
Washington:											
Seattle	0		0	15	4	2	0	7	0	12	91
Spokane	0		0	0	0	3	0	0	0	0	26
Tacoma	0		0	0	1	0	0	2	0	1	30
Oregon:											
Portland	0		0	2	1	1	0	1	0	15	72
Salem	1			0		0	0		0	1	
California:											
Los Angeles	2	2	0	7	2	10	0	20	0	40	329
Sacramento	0		0	1	2	0	0	0	0	12	25
San Francisco	1		0	2	5	1	0	6	0	18	156

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	0	1
New York:			
New York	0	0	1
Ohio:			
Columbus	0	0	1
Michigan:			
Detroit	1	0	0
Wisconsin:			
Milwaukee	1	0	0
Iowa:			
Sioux City	0	0	3
Missouri:			
St. Joseph	0	1	0
St. Louis	0	0	1
Kansas:			
Wichita	0	0	2
Delaware:			
Wilmington	0	0	1
Virginia:			
Richmond	0	0	1
West Virginia:			
Huntington	0	0	3
Kentucky:			
Covington	0	0	1
Arkansas:			
Fort Smith	1	0	1
Louisiana:			
New Orleans	0	0	1
Oklahoma:			
Oklahoma City	0	0	1
Washington:			
Seattle	0	0	6
Tacoma	0	0	1
California:			
Los Angeles	0	0	4

Encephalitis, epidemic or lethargic.—Cases: New York, 1.
Pellagra.—Cases: Savannah, 5; Sacramento, 1; San Francisco, 1.
Typhus fever.—Cases: New York, 3; Wilmington, N. C., 1; Savannah, 3; Montgomery, 1; New Orleans, 2.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 22, 1940.—During the week ended June 22, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	3	1				5
Chickenpox		28	10	193	402	30	20	7	117	807
Diphtheria		1		30	2	7	1			41
Dysentery				2						2
Influenza		3			2				6	11
Measles		3	2	83	220	58	145	13	205	729
Mumps				31	185	4	11		11	242
Pneumonia		3			4		1		1	9
Poliomyelitis							1			1
Scarlet fever		2	1	81	63	4	1	8	2	162
Tuberculosis		10	13		61	3	84	2		173
Typhoid and paratyphoid fever		1		15	6		1	8	1	32
Whooping cough		35		150	70	24	39	4	17	339

NOTE.—None of the above diseases were reported from Prince Edward Island for this period.

SCOTLAND

Vital statistics—Quarter ended March 31, 1940.—Following are vital statistics for Scotland for the quarter ended March 31, 1940:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	12,003	9.6	Deaths from—Continued.		
Births	22,113	17.7	Lethargic encephalitis	32	
Deaths	25,947	20.7	Malaria	1	
Deaths under 1 year of age	2,474	[1] 112.0	Measles	28	
Deaths from—			Nephritis (acute and chronic)	411	
Appendicitis	91		Pneumonia (all forms)	2,389	1.91
Cancer	2,067	1.65	Poliomyelitis	1	
Cerebrospinal fever	105	.10	Puerperal sepsis	22	
Cerebral hemorrhage	1,469		Scarlet fever	8	.01
Cirrhosis of the liver	49		Senility	1,001	
Diabetes mellitus	207		Suicide	104	
Diarrhea and enteritis (under 2 years of age)	147		Syphilis	12	
Diphtheria	135	.12	Tuberculosis (all forms)	1,180	.94
Dysentery	14		Typhoid and paratyphoid fever	10	
Heart disease	5,704		Whooping cough	45	.04
Influenza	1,601	1.28			

[1] Per 1,000 live births.

PUERTO RICO

Influenza.—An outbreak of influenza in Puerto Rico which began about the middle of June has reached epidemic proportions. All parts of the island are affected. A low fatality rate is indicated.

The Department of Sanitation has reported cases as follows: For the week ended June 22, 175; June 29, 1,187; July 6, 8,812; July 13, 16,851.

According to information dated August 2, there has been 69,925 cases, with 200 deaths, up to August 1, 1940.

VIRGIN ISLANDS

Notifiable diseases—April-June 1940.—During the months of April, May, and June 1940, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	April	May	June	Disease	April	May	June
Cerebrospinal meningitis		1		Leprosy	1		
Chickenpox	3			Malaria	1		
Dengue	1			Ophthalmia neonatorum		1	
Filariasis	5	15	11	Schistosomiasis		1	1
Gonorrhea	18	12	7	Syphilis	14	19	11
Hookworm disease	2	5	4	Tuberculosis	1	1	2
Influenza	1		1				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of July 26, 1940, pages 1367-1370 A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

India.—During the week ended July 6, 1940, cholera was reported in India as follows: Sind State, 11 cases; Vizagapatam, 6 cases.

Plague

China.—According to a report dated July 13, 1940, an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh, China, where numerous deaths have occurred.

Egypt—Port Said.—During the week ended July 20, 1940, one case of bubonic plague was reported in Port Said, Egypt.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauilo (vicinity of).—Two rats found on June 28, 1940, in the vicinity of Paauilo, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

United States.—A report of plague-infected fleas in San Bernardino County, California, and of a case of human plague in Emmett, Idaho, appears on page 1412 of this issue of PUBLIC HEALTH REPORTS.

×

Public Health Reports

VOLUME 55 AUGUST 9, 1940 NUMBER 32

IN THIS ISSUE

Cancer Incidence in Pittsburgh and Allegheny Co., Pa.

Public Health Service Publications, January–June 1940

The Care of the Eyes and the Prevention of Blindness

U.S. PUBLIC HEALTH SERVICE * 1798 *

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

Vol. 55 • AUGUST 9, 1940 • *No. 32*

THE INCIDENCE OF CANCER IN PITTSBURGH AND ALLEGHENY COUNTY, PENNSYLVANIA, 1937 [1]

By ARTHUR J. McDOWELL, *United States Public Health Service*

This is the third of a series of papers giving the findings of a sampling survey of cancer incidence and prevalence in the United States. Data were collected from nine different study areas on the number of cases of malignant neoplasms of all types seen during one calendar year, 1937 for some cities, and 1938 for the others. The studies of Atlanta, Ga., and Chicago, Ill., have already been published (*1*, *2*). The present paper concerns the Pittsburgh study area which comprised the city of Pittsburgh, Pa., and the remainder of Allegheny County. The 1930 census lists the population of Allegheny County as 1,374,410. The study of this area affords an opportunity to compare the amount of cancer in a highly industrialized community with the amount found in areas with different characteristics.

The technique used in collecting the data and the specific information sought in all of these surveys were outlined in the first of these papers and need not be repeated here (*1*). It should be recalled that data were collected from all hospitals, doctors, and clinics in the area, and from the registrar of births and deaths in the city department of health. Sufficient information was obtained to make possible the identification of cases which had been seen and reported by more than one source. Thus it is possible to determine, within the limits of error in reporting, the actual number of persons with malignant growths who were under medical care or observation during the study year.

NUMBER OF CASES REPORTED

The total number of cases reported by doctors and hospitals was 5,559; 4,078, or 74 percent, of these cases were residents of Allegheny County; 1,454, or 26 percent, were nonresidents. During the year

[1] From the Division of Public Health Methods, National Institute of Health The data for this study were collected under the supervision of Miss Clara Councell with the assistance of Miss Maude Perry Miss Bess Cheney was in immediate charge of the tabulation of the data, which was done as a project of the Work Projects Administration. The entire survey was directed by Harold F Dorn.

1937, 1,744 death certificates which listed cancer as a cause of death were filed in this area. A check of these death certificates against the cases reported revealed that 544 of the 1,744 were not reported as cases. These, then, should be added to the 5,559 reported cases, making a total of 6,103 cases for Pittsburgh.[2]

TABLE 1.—*Total number of cancer cases reported, including cases obtained from death certificates, by vital status and residence (with corresponding number of death certificates), Allegheny County, Pa., 1937*

	All cases	Cases reported by doctor(s) and hospital(s)							Cases obtained from death certificate only	Total number of cancer death certificates [1]
		Total	Vital status							
			Alive	Unknown	Dead: Total dead	Dead: With a cancer death certificate [1]	Dead: With a noncancer death certificate	Dead: With no death certificate		
Residents	4,622	4,078	2,608	259	1,211	1,035	67	109	544	1,579
Nonresidents	1,454	1,454	1,014	167	273	165	8	100	(2)	165
Residence unknown	27	27	12	13	2	--------	--------	2	--------	--------
Total	6,103	5,559	3,634	439	1,486	1,200	75	211	544	1,744

1 Any death certificate showing cancer as a cause of death (either with or without any other causes) is here regarded as a "cancer death certificate."
2 "Nonresident cases from death certificate only" were not tabulated.

The usual method of expressing prevalence is as a rate, i. e., the ratio of the number of cases to the population. But since the latest complete census figures on population were collected in 1930, it seems advisable to await more recent population figures before computing such a rate. In the absence of a rate, the number of cases per death is given here. This ratio enables us to make comparisons among various cities and also to compare the observed figures with previously existing estimates. By using it in conjunction with the cancer death rate, an approximate prevalence rate for cancer may be obtained.[3] In computing this ratio it is necessary to use resident cases only[4] since no effort was made to obtain death certificates of nonresidents who died at their place of residence.

2 Hereinafter the word "Pittsburgh" will be used to denote the entire Pittsburgh area. Likewise the word "hospitals" will include hospitals and clinics.

3 In the strict sense of the word, of course, prevalence has reference to the number of cases in the population at one particular time. Actually the prevalence here determined is necessarily somewhat higher than it would be had the period covered been 1 day only, for it includes some who might have died before that day and others first seen after that day. However, inasmuch as cancer does not develop suddenly, all of the cases seen in 1937 may be considered as having existed on January 1, 1937. Thus a prevalence rate could be defined and obtained. For many purposes this sort of prevalence rate is a good device. For making comparisons among various cities an incidence rate also should probably be used. This refers to the cases that originate or are discovered during a set interval of time. The cases on which this rate may be based are listed later in this paper (tables 16, 17, and 18).

4 Elsewhere in this paper, except where otherwise indicated, total number of cases refers to all cases, resident and nonresident.

Table 1 lists by residence both the number of cases and the number of death certificates with cancer as a cause of death. If cancer appeared at all on the death certificate, that certificate is included here. The ratio of all resident cases to all resident cancer death certificates is found to be 2.9 to 1. This is slightly higher than the similar ratio for Chicago (2.6 to 1) but considerably lower than the Atlanta ratio (5.3 to 1). The cancer death rate for the city of Pittsburgh was about 110 per 100,000 in 1930. If this rate prevailed through 1937 in the entire Pittsburgh area the case rate of cancer prevalence must have been at least 319 per 100,000. This estimate would seem to be conservative since cancer death rates have actually increased in almost every State in that time. This technique of estimating prevalence has serious defects which should be recognized. It fails to allow for differences in age distributions of the population among the cities and, more serious, in site distributions of the cases of malignant growths. Moreover, it is necessary to take into consideration the error of underreporting that enters into all of the surveys, perhaps to a varying extent.

EVALUATION OF ERROR OF UNDERREPORTING

It was pointed out in the first of these papers (*1*) that the incidence of cancer to be established in this survey would not be the total number of persons with any malignant growth, a number obviously impossible to ascertain, but rather the number of such cases which have come under medical observation. The discrepancy between the number of observed cases and the actual, undeterminable number of existing cases is not the error of underreporting mentioned here; it is not, in one sense, an error, since the incidence is defined as relating to diagnosed cases. What is meant is rather the extent to which the reported cases do not include all the cases that were under care or observation.

It is quite clear that not every case within the scope of the survey was reported. This is true in spite of the fine cooperation given by the doctors and hospitals. The error that is introduced by underreporting is partly due to the fact that reports were not obtained from all of the doctors; however, it is principally because of incompleteness in the reports that were submitted. The number of doctors in active practice in Pittsburgh was 1,804. Reports were obtained from all but 21 of these doctors, that is, from over 98 percent. The error that could arise from the small number of doctors not reporting would seem to be very small. In respect to completeness of reports, there is undeniably some underreporting introduced by doctors who reported fewer cases than they had actually seen, and by those who reported no cases but who had had one or more cases. Presumably these omissions were largely unintentional on the part of the reporting

doctor. It is true that in a few instances the doctor may have reported no cases as an easy way to seem cooperative and yet avoid the work of filling out the report. But, for the most part, whatever error does enter in through underreporting was unintentionally introduced by doctors who made out their reports as well as they could, but who depended largely on a combination of memory and a patient-payment record for obtaining data about cases they had diagnosed.

The cancer death certificates obtained from the Department of Health were checked against the reported cases as an indication of the completeness of the reporting. Table 1 shows that 544 death certificates were not reported as cases, and that the total number of resident death certificates was 1,579. But it must be realized that the existence of 544 unreported death certificates does not mean that all these 544 cases should have been reported, for in this group are cases which had never come under medical care. Many of the cases for which the death certificate was signed by the coroner or health officer were seen by that official only after death and may never have been seen by a doctor prior to death. In addition, an investigation of a sample of the death certificates showed that some of the other cases had been seen and diagnosed only shortly before death.

Nevertheless, the ratio of these unreported cases to the total resident deaths is of value in establishing a maximum of error. The 544 death certificates constitute 34 percent of the total resident deaths. As has been pointed out, the actual underreporting of dead cases that had received medical attention is probably considerably less than this. As for the reporting of living cases under treatment, it seems reasonable to suppose that the underreporting is still less, for the living cases have been seen more recently by the doctor and are more easily remembered.

It is necessary to evaluate the underreporting of cases under observation but not under treatment as a problem separate from the underreporting of cases under treatment. There is probably less complete reporting of the former group. Not only are there a great many cases of malignancy which are not followed up after apparently successful treatment, but those cases which are followed tend to be less readily reported. Often no record is made of the follow-up visit and examination since there is no charge for this visit and no record is required for billing purposes. If a notation is made, it is almost always entered on the patient's original record and can be discovered only by examining all of the doctor's records covering years of practice. For treatment cases, on the other hand, a listing by year is often available. Consequently the percentage of error found probably understates the amount of underreporting of "cases under observation only."

It should be recognized that the number of cases seen or treated but not reported would be considerably larger than it is were it not for duplications in the reporting. While failure to report any case will minimize the amount of duplication, it will not affect the total number of cases unless that particular case is reported by no one else. Since 30 percent of the cases were reported from more than one source (table 3), it seems clear that a considerable number not reported by any particular doctor were reported from some other source. Were it not for this duplication the error of underreporting here discussed would be greater.

CONCENTRATION OF CANCER TREATMENT WITHIN MEDICAL PROFESSION

An examination of the number of cases reported by each agency (table 2) shows that treatment of cancer patients is largely taken care of by relatively few doctors and hospitals. One hundred and thirty-one doctors (only 8 percent of the total number reporting) together with 36 hospitals (47 percent of the total number) reported 6,847 cases.

TABLE 2.—*Numbers and percentages of doctors and hospitals reporting, and number of cancer cases reported by each, with actual number of cases (duplicated and unduplicated), Allegheny County, Pa., 1937*

Number of cases reported by each	Number reporting		Percent reporting		Actual number of cases reported
	Doctors	Hospitals	Doctors	Hospitals	
0	890	32	54	41	0
1	282	3	17	4	285
2	190	2	12	2	394
3	79	3	5	4	246
4	53	1	3	1	216
5	23	0	1	0	115
6–10	68	6	4	8	565
11–50	52	12	3	16	1,410
51–100	6	6	[3]	8	849
Over 100	5	12	[3]	16	4,023
Total reporting	[1] 1,648	77	100	100	[2] 8,093

[1] This number does not include 135 doctors who submitted "joint reports" with other doctors.
[2] Cases listed here include many duplications of the same case reported by different sources; these were subsequently eliminated.
[3] Less than one-half percent.

This is 85 percent of the entire number of cases (duplicated and unduplicated) reported. Still more striking is the fact that 5 doctors (0.3 percent of the total) and 12 hospitals (16 percent) reported over 50 percent of the entire number of cases (4,023). At the other extreme, 54 percent of the doctors and 41 percent of the hospitals reported no cases, while an additional 29 percent and 6 percent, respectively, reported either one or two cases each. This is because many of the hospitals and doctors specialize in fields in which cancer is relatively rare (a number of the hospitals are nursing homes, tuberculosis sanatoria, etc., while many doctors are in fields such as pediatrics, neuropathology, etc.), and also because many general practi-

tioners make no effort to diagnose cancer but immediately refer every suspected case. On the other hand, from the very nature of the disease, the dermatologist, radiologist, roentgenologist, and surgeon tend to see a great many cases of cancer.

EXTENT OF DUPLICATION—REPORTING SOURCE

The extent to which cases were reported by a particular source, (i. e., by a hospital, doctor, or both) and by more than one source, is shown in table 3 and appendix table 3.

TABLE 3.—*Percentages of all cancer cases, by sex and color, reported by various sources, according to number and nature of reporting agencies, Allegheny County, Pa., 1937*

Reported by	Percentage of cases reported						
	Total	Total by sex		White		Colored	
		Male	Female	Male	Female	Male	Female
Hospital(s) only	40	46	35	46	34	68	61
Doctor(s) only	37	33	40	33	41	16	14
Both hospital(s) and doctor(s)	23	21	25	21	25	16	25
Total	100	100	100	100	100	100	100
One source only	70	72	70	72	70	75	65
Two sources only	21	21	21	21	21	15	21
Three sources only	7	6	7	6	7	8	11
More than three sources	2	1	2	1	2	2	3
Total	100	100	100	100	100	100	100

It has already been indicated that because of underreporting the data tend to understate the extent of duplication. One other factor contributing to this situation should be noted here, namely, that 135 of the 1,804 doctors filed "joint reports." Where several doctors made out a single report representing a joint practice the case report was credited to one of the doctors while the others were each credited with a joint report. These account for a part of the 135 joint reports, and the rest represent reports of doctors who merely stated that all of their cases were included in the report of some hospital, or had been referred for treatment to some local doctor or hospital. If the reports of these 135 doctors had been obtained, the amount of duplication would have been increased.

Table 3 shows that 70 percent of the 5,559 unduplicated cases were reported by one source only, while 30 percent were reported twice or more. It would be a mistake, however, to conclude that an error of only 30 percent would have been introduced by failing to eliminate duplicates, for many of the 1,600-odd cases that were duplicated were reported three or more times. In fact, a comparison of the total number reported (8,093) with the actual number of cases (5,559) shows that these 1,600 cases were reported some 4,100 times, causing

an excess of 2,500 cases. Failure to eliminate duplicates would have increased the figure not by 30 but by 46 percent.

An examination of the relative figures for white and colored persons in table 3 shows that colored cases tend to be seen by only one source in the greatest percentage of cases, and greatly exceed the whites in the percentage seen by hospitals only (68 and 61 percent for colored males and females, respectively, and 46 and 34 percent for white). This is an indication of the extent to which care of colored cases is limited to hospital clinics. Only 16 percent of the cases among colored males and 14 percent among colored females were reported solely by doctors, as compared with 33 percent and 41 percent for white males and females, respectively.

For white cases some differences by sex appear in the relative frequency of duplications and in the most common reporting source. Cases among females are more frequently duplicated and are reported more often by doctors only, and less often by hospitals only. The explanation of these differences, at least the immediate explanation, appears when the data are examined separately by site. Table 4 lists the nine main primary sites and the percentage of cases duplicated in each group. Since the sites with the most duplication are more frequent sites in females, it follows that there is more duplication among females than among males.

TABLE 4.—*Percentage of duplication in reporting of cancer cases, by site of malignancy, numbers of cases reported, and source reporting, Allegheny County, Pa., 1937*

Primary site	Percent duplicated	Number of unduplicated cases			Number of duplicated cases			
		Doctor	Hospital	Total	Doctors only	Hospitals only	Doctor-hospital	Total
Buccal cavity	23	107	175	282	11	32	43	86
Digestive tract	32	406	491	897	30	37	353	420
Respiratory system	31	44	97	141	7	18	39	64
Genitourinary system	36	459	514	973	48	67	425	540
Breast	35	335	263	598	32	13	273	318
Skin (except lip)	10	362	275	637	9	12	51	72
Brain	29	20	32	52	2	2	17	21
Bones (except jaw)	38	28	30	58		3	33	36
All others	20	153	138	291	11	5	57	73
All sites	30	1,914	2,015	3,929	150	189	1,291	1,630

The other marked sex difference shown in table 3 is that the percentages of all cases reported by hospitals only, and by doctors only, are 46 and 33, respectively, for males, but are 34 and 41 for females. That is, the cases among females tend to be more often reported by a doctor only and less often by a hospital only than do those among males. As in the case of the sex difference discussed above, the immediate explanation is found in the sites involved. Table 4 shows that cases reported by hospitals only far exceed those reported by doctors

only in every site except breast, genitourinary, skin, and "all others." The two most important of these four groups occur predominantly among females. It is not clear why the sites of cancer which predominate among males should be more frequently reported by a hospital than by a doctor, while the reverse is true of sites predominating among females. There would seem to be a relationship between the accessibility of the site and the frequency with which it is reported by doctors. The order of sites arranged according to the relative frequency of reports by doctors only is as follows: breast, skin, all others, genitourinary, bones, digestive tract, buccal cavity, brain, and respiratory. Except for the buccal cavity, this order roughly corresponds to the accessibility of the sites, and so it might be contended that the reports made by doctors only tend to be cases with more easily accessible sites, the greatest portion of which are among females.

CONFIRMATION OF DIAGNOSIS

The problem of confirmation of diagnosis, i. e., whether diagnoses were confirmed by microscopic tissue examination (biopsy or necropsy), might have been considered earlier along with the problem of evaluating the elements of error in the data. It is indeed important to know how much confidence can be placed in the cancer diagnoses reported by various doctors and institutions. But the question "to what extent are diagnoses of malignancy reliable" is a much broader one and merits special consideration.

Table 5 lists all reported cases according to whether the diagnosis was confirmed by a microscopic test. The data are classified according to site and are given for cases reported by a hospital (either with or without other reports from hospitals or doctors) and for cases reported by doctors only. Of all the cases, 62 percent were confirmed by a microscopic tissue examination. Of cases that were reported by a hospital, 65 percent had such a test. Of cases seen by doctors only, 58 percent were confirmed by microscopic examination. It should be recognized that these percentages—for doctors only and for hospitals—cannot properly be compared since the latter group may include many cases seen by a doctor as well as by a hospital.

There are sharp differences in the relative frequency of microscopic examinations among the several sites. Seventy-nine percent of the cases of breast cancer were thus confirmed, while only 46 percent of the malignancies of the digestive tract were microscopically examined. For genitourinary malignancy, as for breast cancer, there was a high percentage (72) of microscopic tests. The determining factor in this seems to be largely accessibility. The breast and genitourinary

malignancies lend themselves most readily to removal of tissue for examination; the digestive tract, respiratory system, and brain are least accessible for this purpose. In many of the buccal cavity malignancies (which are largely lip), and in the skin malignancies, the removal of the tissue specimen would cause obvious disfiguration. Dermatologists, in making their reports, often offered this explanation for cases without microscopic examination.

TABLE 5.—*Percentage of all cancer cases with microscopically confirmed diagnosis by site and by reporting source, with actual number of cases confirmed and not confirmed, Allegheny County, Pa., 1937*

Primary site	Percent of all cases confirmed by microscopic diagnosis			Number of cases			
				Confirmed by microscopic diagnosis		Not confirmed by microscopic diagnosis	
	Total	Hospital	Doctor only	Hospital	Doctor only	Hospital	Doctor only
Buccal cavity	51	48	57	121	67	129	51
Digestive tract	46	48	42	421	185	460	251
Respiratory system	52	53	47	82	24	72	27
Genitourinary system	72	74	67	742	342	264	165
Breast	79	85	69	468	253	81	114
Skin (except lip)	60	71	50	240	186	98	185
Brain	56	45	82	23	18	28	4
Bones (except jaw)	61	70	39	46	11	20	17
All others	65	64	66	129	108	71	56
All sites	62	65	58	2,272	1,194	1,223	870

PRIMARY SITE DIFFERENCES BY SEX AND COLOR

Attention has already been drawn to the fact that there are decided differences in the frequency with which malignancies occur in certain sites in males and females. Table 6 and appendix table 6 give the percentages and the actual numbers of cases by primary site groups, sex, residence, and color of all cases (including cases from death certificates only).[5]

It is well known that the various distributions (age, sex, site, etc.) of cases drawn from a particular population will be a function of that population and will reflect any unusual distribution that exists in the study group. Here, however, the group studied included the entire population and so the conclusions are not thus biased insofar as Pittsburgh is concerned. When detailed comparisons are made with other cities the population will be carefully analyzed.

[5] It was decided to include the "death-certificate-only cases" with the reported cases in most of the following tables (all marked as to inclusion). This tends to overweigh the data very slightly in two respects: (1) the proportion of persons in the older ages, (2) the proportion of the cases that are primary in the digestive tract. But since the number of cases from death certificates only is less than 10 percent of the total, the effect of their inclusion is slight. Appendix tables 1 and 2 give the number of cases and the percentage distributions by age and by primary site for reported cases (exclusive of death-certificate-only cases).

TABLE 6.—*Percentage distribution of all cancer cases (including reports from death certificates only) by primary site and sex, Allegheny County, Pa., 1937*

Primary site	Percentage of cases in each site group		
	Total	Male	Female
Buccal cavity	6	11	2
Digestive tract	26	36	19
Respiratory system	4	7	2
Genitourinary system	26	18	33
Breast	16	1	27
Skin	12	16	9
Brain	1	2	1
Bones	2	2	1
All others	7	7	6
All sites	100	100	100

It will be noted that, in males, the digestive tract is by far the most frequent site, with skin, buccal cavity, and genitourinary system the only other especially frequent sites. These four sites account for 81 percent of all the male cancer cases, and the digestive tract alone accounts for over one-third of them. For females, however, the most frequent site is the genitourinary system. This site was reported in one-third of the cases, while breast cancer was reported in more than a fourth (27 percent) of all cases. These two sites constitute 60 percent of all reported cases among females. The only other site among females in which any appreciable number of cases occurred was the digestive tract with 19 percent.

In the tabulation by color in appendix table 6, the colored cases show a marked accentuation of the tendency of the cases to fall into certain groups. Among colored males 48 percent of the cases were primary in the digestive tract (36 percent for white males), and among colored females 50 percent of the cases were of the genitourinary system (32 percent for white females). This is probably another indication that cases among colored persons are often first diagnosed at a late stage of the disease, when metastases and extensions make diagnosis of primary site difficult. A carcinoma of the ovary, for example, might be called cancer of uterus if the diagnosis is made at a late stage of the condition.

There seem to be some slight differences between residents and nonresidents in the site distribution of all cases. The proportion of cases of the digestive tract is lower, while the proportions in the buccal cavity, skin, brain, and bones are slightly higher among nonresidents. This is to be expected, since patients with cancer of the digestive tract are often too ill to travel in search of medical care. Not only are they likely to be more completely incapacitated, but the diagnosis is often made at a rather advanced stage and their duration of life after diagnosis is likely to be much less than the duration of cases of other sites. (See table 14.)

These differences in distribution between resident and nonresident patients and white and colored do not noticeably affect the percentage distribution by site for all cases by sex as given in table 6.

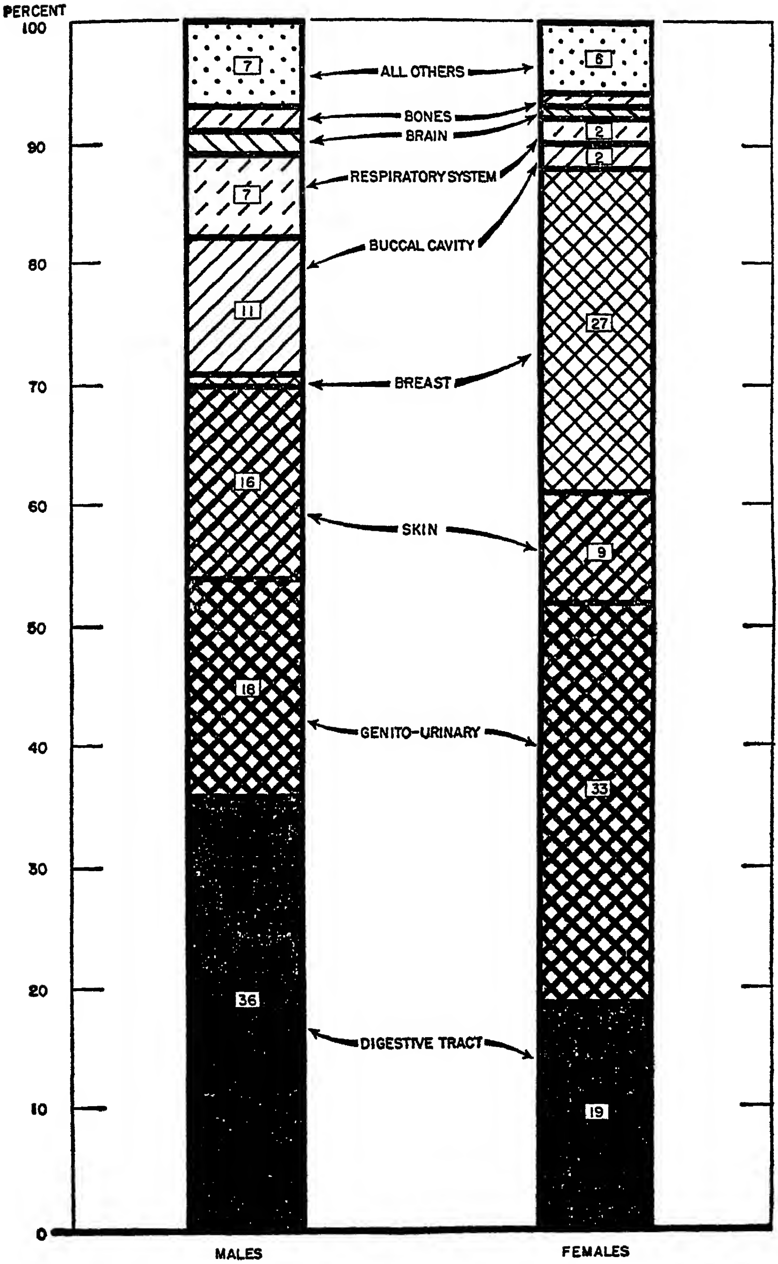

Figure 1.—Percentage distribution of cases of cancer by sex and primary site, Allegheny County, Pa., 1937.

In order to show the great differences in the fatality of various types of cancer, table 7 lists the number of cases by primary site and by vital status at the close of the study period. The ratios of total cases to dead cases used here do not indicate the actual extent of the disease since they are based on both residents and nonresidents, and nonresidents tend to magnify this ratio (they may have died at home and not be listed as dead in the report). This explains why the ratio for all sites is here 3.4 to 1, while for resident cases it was shown to be 2.9 to 1. However, these ratios do serve to compare the relative fatality among the various sites.

There were over 26 cases of skin cancer for every death from this site, while there were only 1.7 cases of malignant tumor of the brain for every death. Cancers of the brain, digestive tract, respiratory system, and bones are especially fatal, while there are considerably more cases per death where the site is the buccal cavity, breast, genitourinary system, or "all others."

TABLE 7.—*Number of cases reported*[1] *by primary site and by vital status (as of January 1, 1938), with the ratios of total to dead cases and percentages of all cases seen during year that were alive at the end of the year, Allegheny County, Pa.*

Primary site	Number of cases[1]			Number of cases (living or dead) per dead case	Percent alive on January 1, 1938
	Alive	Dead	Total		
Buccal cavity	287	63	350	5.6	82.0
Digestive tract	603	610	1,213	2.0	49.7
Respiratory system	102	88	190	2.2	53.7
Genitourinary system	1,003	380	1,383	3.6	72.5
Breast	687	165	852	5.2	80.6
Skin	643	25	668	26.7	96.3
Brain	24	36	60	1.7	40.0
Bones	47	34	81	2.4	58.0
All others	238	85	323	3.8	73.7
All sites	3,634	1,486	5,120	3.4	71.0

[1] Excluding 489 cases of unknown vital status.

AGE DISTRIBUTION OF THE CANCER CASES

Of course cancer is primarily a disease affecting people of the older ages. But this has been so often repeated that it tends to obscure the extent to which malignant growths are found among middle aged and even young persons. During the study year in Pittsburgh, 1,048 (18 percent) of the reported cases were under 45 years of age. Ninety-four were under 20 years of age, and 171 were between 20 and 30 years old. The median age for all the cases reported in the Pittsburgh survey was 57 years, 59 for males, and 56 for females. That is to say, one-half of the total cases were aged 57 years or less. And, if 65 years of age is used to denote the lower limit of old age, then 68 percent of the cases were below this level; only 32 percent were "aged." This is not to deny that cancer prevalence rates are highest among elderly

persons. Even though only 32 percent of all the cancer cases occurred in persons 65 or over, those cases derive from a relatively small population and represent a much higher rate than the number readily indicates.

The age data were considered separately by residence, color, and sex before table 8 was prepared. It was found that resident and nonresident figures differed but little in distribution and that the colored persons, while they did tend to be somewhat younger than the white, did not differ by enough to affect markedly the combined age distribution. (The colored constituted only about 3 percent of the total.) Consequently, these groups are combined in table 8. There was found to be a difference in age distribution of male and female cases, as shown in the table. The actual numbers from which these percentages were derived are shown in appendix table 8 and are also given by sex, color, and residence.

TABLE 8.—*Age distribution of all*[1] *cases of cancer by cumulative percentages in or below each 5-year age group, by sex, Allegheny County, Pa., 1937*

Age group	All cases		Male		Female	
	Percent in each group	Percent in or below each group	Percent in each group	Percent in or below each group	Percent in each group	Percent in or below each group
Under 5	(2)	----	(2)	----	(2)	----
5–9	(2)	----	(2)	*1*	(2)	----
10–14	(2)	*1*	(2)	*1*	(2)	*1*
15–19	1	*2*	1	*2*	(2)	*1*
20–24	1	*3*	1	*3*	1	*2*
25–29	1	*4*	2	*5*	2	*4*
30–34	3	*7*	2	*7*	3	*7*
35–39	4	*11*	3	*10*	5	*12*
40–44	7	*18*	5	*15*	8	*20*
45–49	10	*28*	9	*24*	12	*32*
50–54	13	*41*	12	*36*	13	*45*
55–59	13	*54*	13	*49*	14	*59*
60–64	14	*68*	14	*63*	12	*71*
65–69	12	*80*	14	*77*	11	*82*
70–74	10	*90*	11	*88*	9	*91*
75–79	6	*96*	8	*96*	5	*96*
80–84	3	*99*	3	*99*	3	*99*
85–89	1	*100*	1	*100*	1	*100*
90 and over	----	*100*	----	*100*	----	*100*

[1] Includes all reported cases and cases obtained from death certificate only.
[2] Less than one-half percent.

SEX DIFFERENCES IN AGE DISTRIBUTION

The sex difference in age distribution occurs in the years 30 to 75, a larger percentage of females than males being in the lower portion of that span with the proportions reversed in the latter part of those years. Forty-seven percent of the female cases are between the ages of 40 and 59, and only 39 percent of the male cases. A consideration of the age distributions for each of the primary site groups will show that this is because cancers of the breast and genitourinary system, the important sites in females, tend to be found largely in this (40–60) age span.

FIGURE 2.—Percentage distribution of cases of cancer by age and sex, Allegheny County, Pa., 1937.

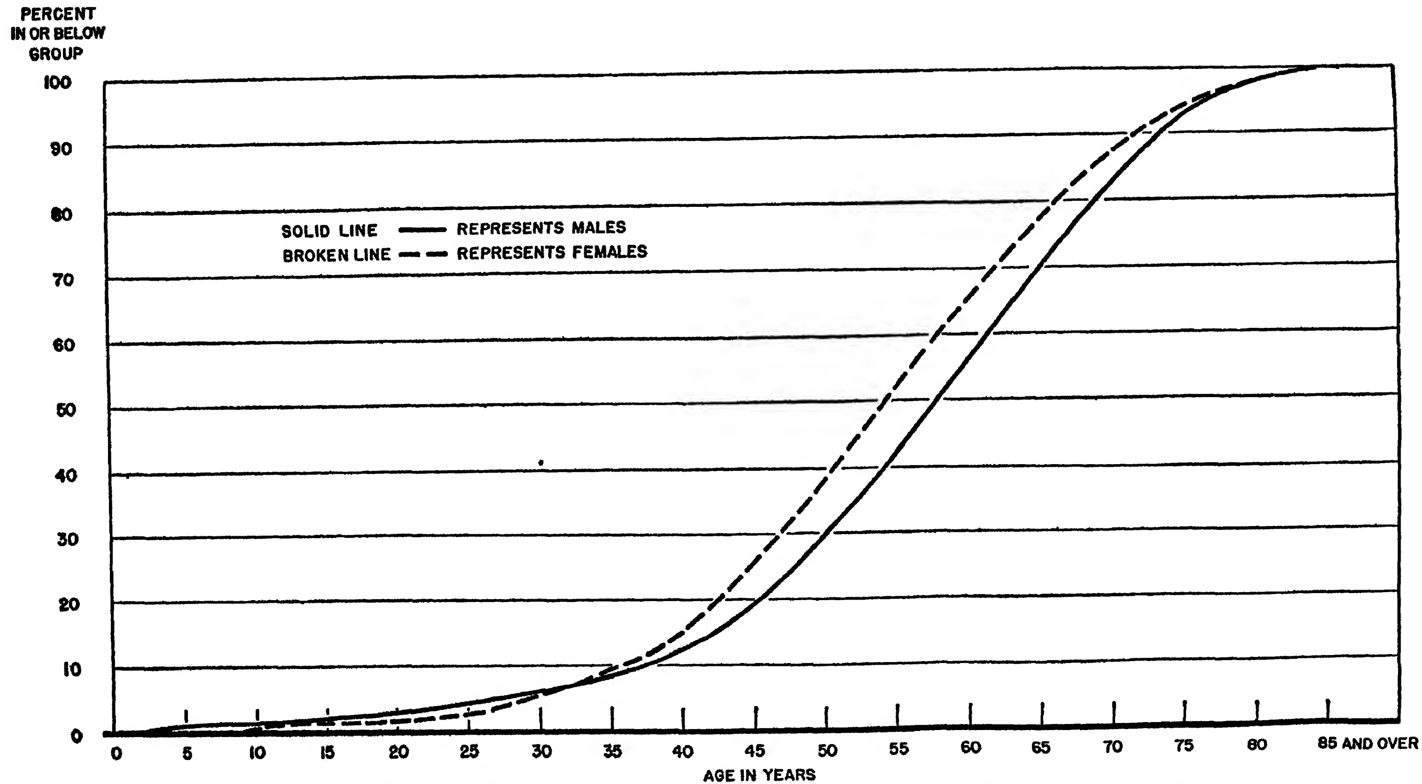

FIGURE 3.—Percentage distribution of cancer cases by age and sex (cumulative percentage at or below each age), Allegheny County, Pa., 1937.

AGE DISTRIBUTIONS BY SITE AND SEX

Because a number of differences have been found between cases of malignancy in males and females, both in the frequency with which particular sites occur and in the ages which are most often affected, it is well to examine the data separately by sex in the consideration of the interrelationship of site and age.

All cases among males are tabulated in appendix table 9 by age groups and by primary sites. For more ready comparison table 9 lists the percentage age distribution for each primary site (using cumulative percentages), and table 10 shows the percentage site distribution for each age group.

TABLE 9.—*Percentage age distribution of cases for each primary site and for all sites, males only (cumulative percentage in or below any age group) Allegheny County, Pa., 1937*

Age group	Percent of cases for each site, in and below any age group								
	Buccal cavity	Digestive tract	Respiratory system	Genito-urinary system	Skin	Brain	Bones	All others	All sites
Under 5					1	2	4	3	
5-9					1	18	6	3	1
10-14					1	20	9	4	1
15-19				1	2	20	15	6	2
20-24	1	1		2	3	34	24	8	3
25-29	2	2	1	4	4	43	24	13	5
30-34	2	4	2	6	6	54	30	16	7
35-39	5	6	6	7	12	61	30	20	10
40-44	8	10	15	11	16	71	35	29	15
45-49	17	20	33	16	21	84	50	40	24
50-54	31	33	49	26	33	86	56	50	36
55-59	46	48	66	34	46	93	63	62	49
60-64	62	64	82	47	57	100	78	74	63
65-69	76	78	90	67	73		89	82	77
70-74	87	90	96	84	85		94	93	88
75-79	97	96	99	94	95		100	95	96
80-84	98	99	100	99	99			99	99
85-89	100	100	100	100	100			100	100
90 and over	100	100	100	100	100	100	100	100	100
Number of cases	287	920	176	445	387	56	54	178	[1] 2,516

[1] Cases of unknown age excluded. Cases obtained from death certificates are included.

Percentage age distribution not computed for "breast" primary, since there were only 13 cases.

There are considerable differences in age distributions for the various sites. Three groups of sites occur much more frequently in younger people than do any of the others. These are malignancies of the brain, bones, and "all other sites"; 54 percent of the brain cases, 30 percent of the bone cases, and 16 percent of those included under "all others" occurred in persons under 35 years of age. A very different age distribution is presented by malignancies of the skin, the buccal cavity, the genitourinary system, and the digestive tract. The percentages of cases among persons under 35 in these groups were, respectively, 6, 2, 6, and 4, while persons over 65 constituted 43, 38, 53, and 36 percent of these same groups. Respira-

tory cases seem to be concentrated in neither younger nor older persons, but rather in the age group from 40 to 70. Only 2 percent of these were under 35 years, 18 percent were 65 years or over, and only 10 percent were over 70 years of age.

TABLE 10.—*Percentage site distribution of cases [1] for each age group [2] and for all ages combined, males only, Allegheny County, Pa., 1937*

Age group	Percent of cases for each age group in each primary site group										Number of cases
	Buccal cavity	Digestive tract	Respiratory system	Genito-urinary system	Breast	Skin	Brain	Bones	All others	All sites	
Under 20	4	11	—	7	—	13	24	17	24	100	46
20-24	5	16	—	19	—	14	22	13	11	100	37
25-29	3	24	5	16	—	14	14	—	24	100	37
30-34	2	29	4	19	2	15	13	6	10	100	48
35-39	10	25	8	11	1	32	5	—	8	100	73
40-44	9	34	13	12	—	11	5	2	14	100	126
45-49	10	41	14	11	—	10	3	3	8	100	229
50-54	14	40	10	14	1	14	—	1	6	100	298
55-59	13	41	9	12	—	16	1	1	7	100	327
60-64	13	41	8	16	1	12	1	2	6	100	357
65-69	12	37	4	24	—	17	—	2	4	100	351
70-74	11	36	4	25	—	16	—	1	7	100	297
75-79	14	31	3	25	2	21	—	2	2	100	192
80-84	3	41	1	27	—	19	—	—	9	100	74
85 and over	29	25	—	21	—	17	—	—	8	100	24
All ages	11	36	7	18	1	16	2	2	7	100	[1]2,516

[1] Cases obtained from death certificates only are included.
[2] Percentage site distribution not computed for 5-year age groups below 20 years or above 84 because of too few cases.

TABLE 11.—*Percentage age distribution of all cases [1] of cancer for each primary site and for all sites, females only (cumulative percentages in or below any age group), Allegheny County, Pa., 1937*

Age group	Percent of the cases, for each site, in and below any age group									
	Buccal cavity	Digestive tract	Respiratory system	Genito-urinary system	Breast	Skin	Brain	Bones	All others	All sites
Under 5	2	—	—	—	—	—	3	2	1	—
5-9	2	—	2	—	—	1	17	7	2	—
10-14	2	—	2	—	—	1	21	19	3	1
15-19	2	—	6	1	—	1	21	26	5	1
20-24	5	1	6	2	1	2	24	30	8	2
25-29	5	2	6	4	2	4	31	35	13	4
30-34	5	3	6	8	5	5	38	37	19	7
35-39	8	5	7	15	10	8	45	37	25	12
40-44	10	10	17	24	20	11	48	47	31	20
45-49	21	19	28	37	35	19	59	53	40	32
50-54	34	28	44	53	49	31	69	65	52	45
55-59	42	41	63	67	65	41	90	72	65	59
60-64	55	54	74	79	78	56	93	84	75	71
65-69	73	70	81	88	88	67	100	91	83	82
70-74	84	83	96	95	95	82	100	95	92	91
75-79	89	94	98	99	98	90	100	98	96	96
80-84	94	98	100	100	99	98	100	100	98	99
85-89	100	100	100	100	100	100	100	100	99	100
90 and over	100	100	100	100	100	100	100	100	100	100
Number of cases	62	673	54	1,154	926	293	29	43	223	[1]3,536

[1] Cases of unknown age excluded. Cases obtained from death certificate only are included here.

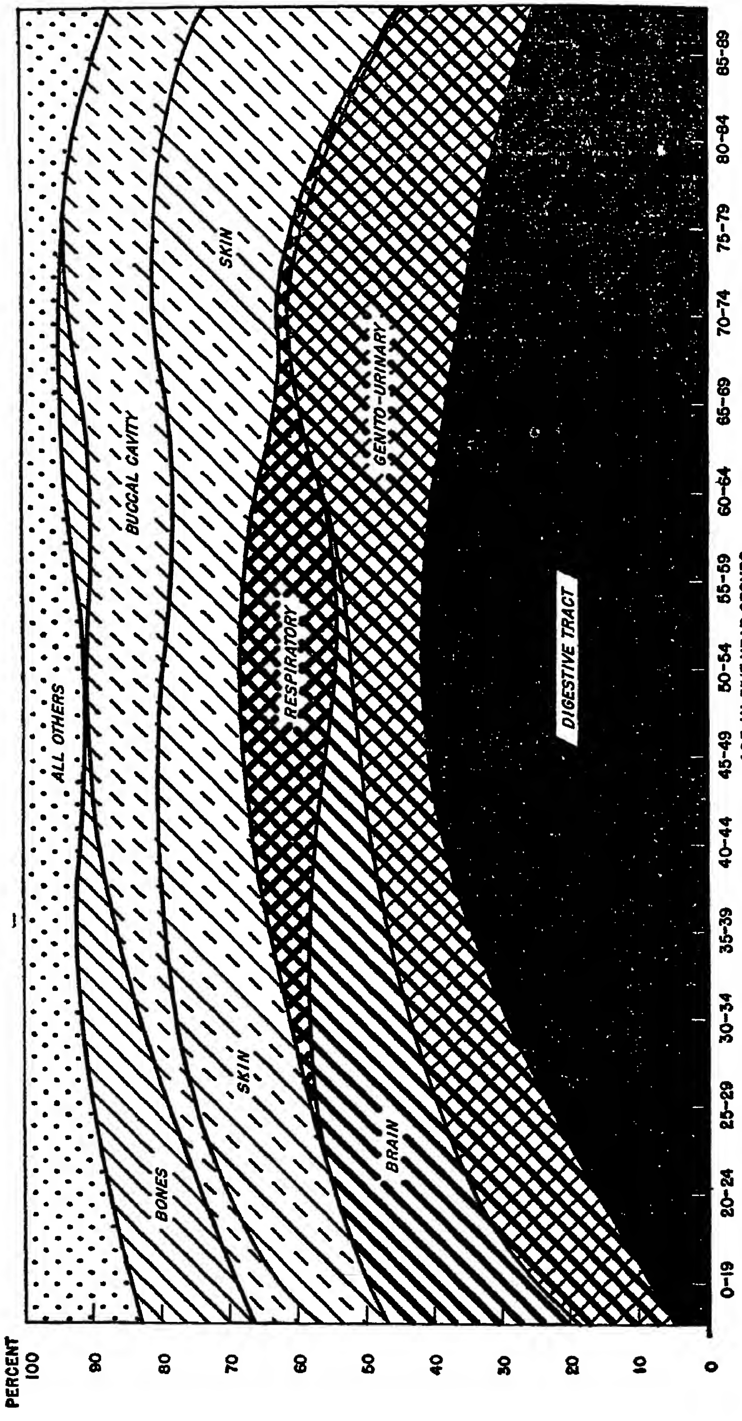

FIGURE 4.—Percentage distribution of cases of cancer by primary site and age, males only, Allegheny County, Pa., 1937

TABLE 12.—*Percentage site distribution of all cases of cancer*[1] *for each age group*[2] *and for all ages, females only, Allegheny County, Pa., 1937*

Age group	Buccal cavity	Digestive tract	Respiratory system	Genito-urinary system	Breast	Skin	Brain	Bones	All others	All sites	Number of cases
Under 20	2	4	6	17	4	6	18	23	25	100	48
20-24	6	6		32	19	9	3	6	19	100	32
25-29		11		42	18	8	3	3	15	100	65
30-34		11		45	23	8	2	1	15	100	97
35-39	1	8	1	48	29	5	1		7	100	182
40-44		12	2	40	35	4		2	5	100	258
45-49	2	14	2	36	34	5	1	1	5	100	408
50-54	2	13	2	40	28	7	1	1	6	100	468
55-59	1	18	2	32	32	6	1	1	6	100	474
60-64	2	21	1	32	27	10		1	5	100	433
65-69	3	28	1	29	24	8	1	1	5	100	384
70-74	2	28	3	26	20	14		1	6	100	307
75-79	2	40	1	23	17	13			4	100	177
80-84	3	32	1	14	16	26		1	7	100	88
85 and over	11	42		6	11	19			11	100	86
All ages	2	19	2	33	27	9	1	1	6	100	[1]3,536

[1] Cases obtained from death certificate only are included here.
[2] Site distribution not computed for 5-year age groups below 20 years or above 84 years because of too few cases; nor is it computed for the age unknown group.

The age distribution by site for females, shown in table 11, is very similar to that for males in all but two sites, breast and genitourinary. For these two sites, cases tend to be found in the middle portion of the age span. Two-thirds of these cases are between the ages of 45 and 70 (64 percent for genitourinary and 68 percent for breast).

DURATION OF MALIGNANT CASES

Just as cancer prevalence, as considered in this paper, refers to the prevalence of diagnosed cases of cancer, so the problem of duration concerns the duration of cases after they have been diagnosed as malignant. The retrospective estimate that the doctor sometimes makes as to duration of the case prior to his first diagnosis is too subjective a judgment definitely to establish duration. What is meant here is the length of time from first diagnosis of malignancy to the end of the study year or to the date of death.

Table 13 and appendix table 13 give the number and percentages of cases reported, by the duration of the case (in 6-month duration groups) for all cases, and for cases classified by color and vital status. Of the 1,486 dead cases, 420, or 28 percent, had a duration of 1 month or less. That means that in 1937 in Pittsburgh 420 cases of cancer were diagnosed only when the malignancy was in such a late stage that death resulted in less than 2 months. This does not include any of the cases, previously mentioned, which were not seen by a doctor prior to death, and which were included only because cancer was specified as the cause of death on the death certificate.

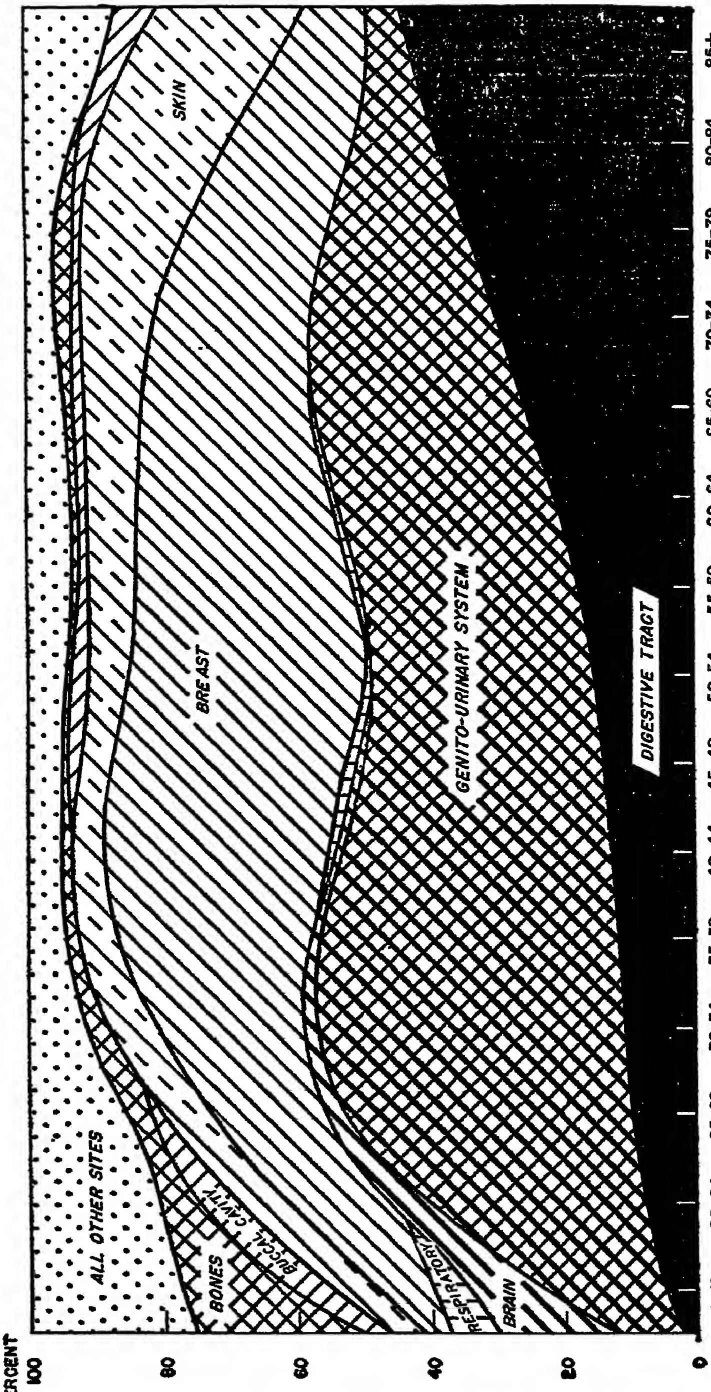

FIGURE 5.—Percentage distribution of cases of cancer by primary site and age, females only, Allegheny County, Pa., 1937.

TABLE 13.—*Percentage of reported cases in each 6-month duration group, by vital status and color, Allegheny County, Pa., 1937* [1]

Duration of case	Percent in any duration group				
	Total	Alive	Dead	White	Colored
Under 6 months	42	33	59	42	47
6-11 months	24	25	21	24	20
12-17 months	11	12	9	11	11
18-23 months	6	8	3	6	5
24-29 months	3	4	2	3	4
30-35 months	3	3	1	3	4
36-41 months	2	3	1	2	3
42-47 months	2	2	1	1	2
48-53 months	1	2		2	1
54-59 months	1	1		1	1
5 years and over	5	7	3	5	2

[1] The average duration is one-half month longer than shown in this table; durations were recorded in months and cases first seen in December 1937 were coded as having zero month's duration.

In table 13 the percentages of all cases in each age group are listed separately for white, colored, alive, dead, and all cases combined. Of the cases that died during the study year 80 percent had been first diagnosed as malignant less than 12 months before death and 59 percent less than 6 months before death. For all cases combined 42 percent had a duration of less than 6 months; for white cases this percentage is 42 and for colored it is 47. On the other hand, 17 percent of the cases had a duration of 2 years or over and 5 percent a duration of 5 years or over.

DURATION ACCORDING TO PRIMARY SITE OF MALIGNANCY

There are marked differences among the various sites in the average duration of cases. A large part of this variation is, of course, a reflection of the varying fatality rates for different sites. Since, for example, malignant neoplasm primary in the brain produces death more often and more rapidly than carcinoma of the breast, the duration of brain cases will tend to be shorter. Table 14 lists for each general site group the percentage of cases in each 6-month duration group. The shortest durations were among the brain malignancies, where 83 percent of those alive had been first seen less than 1 year prior to January 1, 1938, while cancer of the breast had the longest duration, with only 49 percent of the live cases of less than 1 year's duration. Between these two extremes are ranged the other sites in order from lowest to highest: buccal cavity, genitourinary, skin, all others, bones, digestive tract, and respiratory system.

The variation in average duration among the sites results either from the relative differences in fatality or the differences in the extent of follow-up observation for different sites, or from both these factors. That malignant neoplasms of the brain and respiratory system, for example, have a relatively short duration is largely a result of the high fatality of these growths. Skin cancers, on the other hand, are

less often kept under long medical observation subsequent to treatment and so the data given in table 14 (45 percent of the skin cases with a duration of 1 year of more) tend to understate the average duration of this type of cancer.

TABLE 14.—*Percentage of cancer cases in any particular duration [1] group, by primary site and vital status, Allegheny County, Pa., 1937*

Primary site and vital status	Percent of cases with duration (in months)											
	One month	Under 6	6-11	12-17	18-23	24-29	30-35	36-41	42-47	48-53	54-59	60 and over
Buccal cavity:												
Alive	(2)	26	26	11	6	7	6	3	4	3	1	7
Dead	13	43	28	12	6	------	6	5	------	------	------	------
Digestive tract:												
Alive	(2)	43	27	9	6	3	2	1	3	------	2	4
Dead	37	71	17	5	2	1	1	1	------	1	------	1
Respiratory system:												
Alive	(2)	50	32	6	3	2	------	1	2	------	------	4
Dead	24	57	27	8	1	2	2	2	------	------	------	1
Genitourinary system:												
Alive	(2)	32	24	13	9	5	3	3	2	2	1	6
Dead	23	50	26	11	5	2	2	------	1	1	1	2
Breast:												
Alive	(2)	25	24	12	8	5	4	4	2	4	1	11
Dead	13	34	24	17	4	4	1	2	2	1	1	10
Skin:												
Alive	(2)	31	24	15	9	4	2	3	2	2	------	8
Dead	16	32	32	12	12	4	------	------	------	------	------	8
Brain:												
Alive	(2)	58	25	------	4	5	4	------	4	------	------	------
Dead	56	89	12	------	3	------	------	------	------	------	------	------
Bones:												
Alive	(2)	30	36	15	15	------	2	------	------	------	------	2
Dead	21	56	26	9	3	------	3	------	------	------	------	3
All others:												
Alive	(2)	35	26	13	6	4	4	4	1	2	1	4
Dead	32	66	16	7	3	3	1	------	------	------	------	4
All sites:												
Alive	(2)	33	25	12	8	4	3	3	2	2	1	7
Dead	28	59	21	9	3	2	1	1	1	------	------	3

[1] Duration here refers to time from date first seen by doctor to Jan. 1, 1938, or to date of death if in 1937.
[2] Percentages for 1 month and under are listed only for dead cases. This group is included in the under-6-month group.

DURATION AFTER CESSATION OF TREATMENT

Despite all the factors making for underreporting of cases that were "under observation only" during 1937, there were 836 such cases reported in the Pittsburgh area. Treatment had stopped before January 1, 1937, on all of these cases and they were seen during the year merely for follow-up purposes. Appendix table 15, which gives the number of months prior to 1937 since the last treatment had been received, shows that 62 of the 836 cases had been under observation (without any recurrence) for at least 5 years, and 25 of them for 8 years or more. Over one-fourth of these 836 cases were malignant growths primary in the genitourinary system, and nearly a fourth more were primary in the breast. The four sites, genitourinary, breast, skin, and buccal cavity, account for 656, or 78 percent, of the cases under observation only.

TABLE 15.—*Number of cases under observation only during 1937, and percentages such cases are of total cases and of all cases seen prior to 1937, by site, Allegheny County, Pa., 1937*

Primary site	Number of cases			Percent that cases under observation only are of—	
	Total	First seen prior to 1937	Under observation only	Total	Total seen prior to 1937
Buccal cavity	368	169	86	*23*	*51*
Digestive tract	1,316	349	114	*9*	*33*
Respiratory	206	49	7	*3*	*14*
Genitourinary	1,513	623	215	*14*	*35*
Breast	916	460	193	*21*	*42*
Skin (except lip)	709	315	162	*23*	*51*
Brain	73	7	1	*1*	*14*
Bones (except jaw)	94	30	6	*6*	*20*
All others	364	134	52	*14*	*39*
All sites	5,559	2,136	836	*15*	*39*

In table 15 the number of cases under observation only are listed along with the total number of cases reported and the number of cases reported as under observation or treatment on January 1, 1937. These are listed separately by primary site. This same table gives the percentage that the cases under observation only are of all the cases reported and of all the cases that were in existence at the beginning of 1937. For all sites combined 15 percent of the entire number of cases reported were not treated in 1937. For cancers of the breast, skin, and buccal cavity about 1 case in 4 was under observation only. The final column of percentages represents the part of the cases under the care of doctors and hospitals at one particular time that were under observation only and remained free of recurrence for 1 year thereafter. This figure is 39 percent for all sites combined, about 50 percent for skin and buccal cavity, and over 40 percent for breast.

Much speculation has been made about the efficacy of any "cure" in cancer treatment. These data furnish evidence of cases that have been in existence for many years and have remained free from any further development of malignant growth. At the same time, a consideration of appendix table 13 in conjunction with appendix table 15 shows the necessity for caution in speaking of complete cure, for while 293 persons had been diagnosed as having a malignant growth at least 5 years prior to January 1, 1938, 38 of these persons died during the year 1937. An examination of the data on these 38 cases reveals that, while no death certificate was found for 9 of them and the death certificates of 6 of the remainder did not list cancer as a cause of death, cancer was stated to be the cause of death for the remaining 23 cases. That is, these patients had first been seen with cancer in 1932 or earlier and had presumably been cured (since treatment rarely continues for that period of time) but the growth had recurred and caused death during the study year. Still other cases had suffered

recurrences and were, or had been, under treatment. While 293 cases had been in existence for 5 years or more, only 191 cases that were under observation only in 1937 had received no treatment for 2 or more years.

CASES ORIGINATING IN 1937

As pointed out above, the strict problem of incidence concerns the rate at which new cases originate or are discovered. In tables 16, 17, and 18 only cases that were first seen in 1937 are listed. These are tabulated by vital status, age group, and primary site, classified by sex, color, and (for white persons) residence. There were 1,536 new cases of malignant neoplasm among males in 1937, and 1,887 cases among females. During the year 508 of these males died and 441 of the females. For residents these figures are 381 and 347, respectively. The sites already shown to have greater fatality and shorter duration (i. e., brain, respiratory, etc.) are represented in slightly larger proportion among the new cases arising in 1937 than among all cases reported. Male cases, which constituted 42 percent of all cases reported, account for 45 percent of the cases originating in 1937. In general, however, the cases first diagnosed in 1937 present the same picture as did the total number of cases. This is to be expected since they make up 62 percent of that total and, moreover, differ from an additional 23 percent still being treated in 1937 only in that the latter were first diagnosed some time in 1936 instead of in 1937.

TABLE 16.—*Cases of cancer first seen in 1937, by vital status (on January 1, 1938), sex, color, and (for white) residence, Allegheny County, Pa., 1937*

Vital status	Total cases first seen in 1937		White				Colored [1]	
			Resident		Nonresident			
	Male	Female	Male	Female	Male	Female	Male	Female
Alive	867	1,236	585	869	262	336	20	31
Unknown	161	210	101	125	55	82	5	3
Dead	*508*	*441*	*381*	*347*	*101*	*75*	*26*	*19*
Death certificate located	448	383	354	316	70	49	24	18
Death certificate not located	60	58	27	31	31	26	2	1
Total	1,536	1,887	1,067	1,341	418	493	51	53

[1] Five of these cases were nonresidents. The remaining 99 were residents.

TABLE 17.—*Percentage age distribution of cancer cases first seen in 1937, Allegheny County, Pa.*

Age group	Percent of cases in each age group			Age group	Percent of cases in each age group		
	Total	Male	Female		Total	Male	Female
Under 5	0.4	0.5	0.3	55–59	13.5	13.1	13.9
5–9	.5	.7	.3	60–64	13.4	14.2	12.8
10–14	.3	.2	.4	65–69	12.4	13.7	11.3
15–19	.6	.5	.8	70–74	10.5	11.9	9.3
20–24	1.4	1.7	1.1	75–79	5.9	7.3	4.7
25–29	1.7	1.5	1.9	80–84	2.4	2.7	2.2
30–34	2.4	1.7	3.0	85–89	.7	.5	.9
35–39	4.7	3.1	6.1	90 and over	.1	.1	.1
40–44	6.5	5.4	7.3				
45–49	10.1	8.8	11.1	All known ages	100.0	100.0	100.0
50–54	12.5	12.4	12.5				

TABLE 18.—*Percentage site distribution of cancer cases first seen in 1937, Allegheny County, Pa.*

Primary site	Percent of cases in each site group			Primary site	Percent of cases in each site group		
	Total	Male	Female		Total	Male	Female
Buccal cavity	5.8	9.6	2.8	Brain	1.9	3.0	1.1
Digestive tract	28.3	38.5	19.9	Bones (except jaw)	1.9	2.8	1.5
Respiratory system	4.6	8.2	1.6	All other sites	6.7	6.7	6.7
Genitourinary system	26.0	17.6	32.8				
Breast	13.3	.6	23.7	All sites	100.0	100.0	100.0
Skin (except lip)	11.5	13.5	9.9				

SUMMARY

The third area covered in the sampling survey of cancer incidence in the United States (Pittsburgh and the remainder of Allegheny County, Pa.) reported a total of 6,103 cases either under medical care or observation, or dying of cancer during the year. Of this total, 5,559 were reported by doctors and hospitals as having been seen during the year. There were filed during the year in this area 1,744 death certificates that listed cancer as a cause of death. The ratio of all resident cases seen in 1937 to resident deaths was 2.9 to 1. This is higher than the Chicago ratio (2.6 to 1) but considerably below the ratio found for Atlanta (5.3 to 1). This ratio indicates a case rate of at least 319 per 100,000.

The error in this survey is on the side of underreporting, and so the figures establish a minimum prevalence, somewhere below the true figure. The maximum of underreporting is probably about 34 percent (the percentage of resident deaths that were unreported). The actual underreporting of cases under treatment is probably considerably less than this, but cases under observation only tend to be reported much less completely.

Over 50 percent of the cases were reported by only 0.3 percent of the doctors and 16 percent of the hospitals. On the other hand,

about half of the doctors and hospitals saw no cases of cancer during the year.

Thirty percent of the cases were reported by more than one source, many of them by three or more sources. Because identifying information had been collected, it was possible to eliminate all duplication. The extent of duplication varies greatly between white and colored cases, being higher among white cases, and also varies with the site involved.

The diagnosis was confirmed by microscopic examination in 62 percent of the cases reported. The use of tissue examinations varied with the accessibility of the site involved.

The three most important primary sites among males were digestive tract, genitourinary system, and skin; for females, genitourinary system, breast, and digestive tract. Malignant neoplasms of these sites constituted 70 percent of the cases among males and 79 percent of those among females.

Very great differences exist in the relative fatality of malignant growths occurring in various sites. The brain, digestive tract, and respiratory system are the sites with the lowest ratio of cases to deaths.

Eighteen percent of all the cases reported were under 45 years of age. The median age was 57 years; it was 59 for males and 56 for females. The cases among males tend to be concentrated in the older ages considerably more than do those among females. This results from the fact that two-thirds of the malignant growths of the breast and genitourinary system among females occur in the age group 45 to 70.

Study of the duration of the cases revealed that 42 percent of all cases reported had a duration of less than 6 months. Fifty-nine percent of the dead cases had been first diagnosed as malignant less than 6 months before death and 80 percent of them less than 12 months before death. Five percent of the total cases reported had a duration of 5 years or over. The duration varied widely among the different sites. Cases of malignant growths of the brain and respiratory system had the shortest duration and those of the breast, skin, and buccal cavity, the longest duration.

There were 836 cases under observation in 1937 which had not been treated since sometime prior to January 1, 1937. Over three-fourths of these cases were neoplasms primary in the genitourinary system, breast, skin, or buccal cavity. The cases under observation only represent 15 percent of all cases reported. Of all the cases under medical care on January 1, 1937, 39 percent were under observation only and received no treatment during 1937.

In 1937 there were 3,423 new cases, 45 percent of these being among males; white male cases constituted only 42 percent of all cases reported. The cases first seen in 1937 present much the same

distributions as do all cases reported. The chief differences are that the sites with relatively higher fatality and the sites with shorter durations are here represented in somewhat greater proportions.

REFERENCES

(1) Mountin, Joseph W., Dorn, Harold F., and Boone, Bert R.: The incidence of cancer in Atlanta, Ga., and surrounding counties. Pub. Health Rep., 54: 1255–1273 (1939).

(2) Dorn, Harold F.: The incidence of cancer in Cook County, Illinois, 1937. Pub. Health Rep., 55: 628–650 (1940).

Appendix

The tables given in the Appendix, showing the actual numbers of cases used in certain of the tables appearing in the text, are numbered to correspond with the similar tables in the body of the paper, with the exception of appendix tables 1 and 2, which have no counterpart.

TABLE 1.—*Number of reported cases [1] of cancer by age distribution, with the percentage in or below any age group for all cases reported, by sex, color, and (for whites) residence, Allegheny County, Pa., 1937*

Age group	Percent of cases of known age, in or below any age group (all cases)	Number of cases of cancer reported								
		Total	Total by sex		White				Colored [2]	
					Resident		Nonresident			
			Male	Female	Male	Female	Male	Female	Male	Female
Under 5		17	11	6	7	1	3	5	1	
5–9		22	12	10	6	6	6	4		
10–14	1	16	7	9	4	6	3	3		
15–19	2	33	12	21	7	13	5	8		
20–24	3	64	33	31	19	15	10	14	4	2
25–29	5	100	35	65	22	44	8	20	5	1
30–34	7	139	43	96	30	65	13	30		1
35–39	12	247	70	177	39	122	25	43	6	12
40–44	18	365	119	246	69	158	43	73	7	15
45–49	30	609	215	394	151	283	56	97	8	14
50–54	43	731	284	447	186	305	91	129	7	13
55–59	57	733	300	433	209	324	80	99	11	10
60–64	70	732	329	403	231	297	83	91	15	15
65–69	82	635	299	336	210	262	82	68	7	6
70–74	91	525	258	267	202	205	50	58	6	4
75–79	97	293	157	136	112	101	43	34	2	1
80–84	99	129	62	67	44	57	18	10		
85–89	100	34	15	19	11	14	4	4		1
90 and over	100	6	2	4	2	4				
Unknown		129	50	79	36	58	14	20		1
Total at known age		5,430								
All ages		5,559	2,313	3,246	1,597	2,340	637	810	79	96

[1] Does not include cases from death certificate only.
[2] Included here with residents are 8 nonresident colored cases.

TABLE 2.—*Number of reported cases* [1] *of cancer by primary site distribution, with the percentage of all cases in each site and number of cases by sex, color, and residence, Allegheny County, Pa., 1937*

Primary site	All cases combined		Number of cases							
			White						Colored	
			All white		Resident [2]		Nonresident		Male	Female
	Percent	Number	Male	Female	Male	Female	Male	Female		
Buccal cavity	6	341	271	63	163	37	108	26	7	--------
Digestive tract	24	1,317	736	529	575	428	161	101	37	15
Respiratory system	4	205	160	38	120	32	40	6	5	2
Genitourinary system	27	1,507	394	1,045	284	764	110	281	17	51
Breast	16	916	11	885	7	668	4	217	2	18
Skin	13	709	392	311	258	223	134	88	3	3
Brain	1	73	49	24	28	18	21	6	--------	--------
Bones	2	94	49	39	31	28	18	11	4	2
All others	7	397	172	216	131	142	41	74	4	5
All sites	100	5,559	2,234	3,150	1,597	2,340	637	810	79	96

[1] Reported cases only, not including death certificate only cases.
[2] Includes 27 cases with residence unknown and color unknown.

TABLE 3.—*Number of cases reported, by reporting source, by sex and color, Allegheny County, Pa., 1937*

Reporting source	Total	Male	Female	White [1]		Colored	
				Male	Female	Male	Female
One doctor only [2]	1,914	693	1,221	683	1,208	10	13
Two doctors only	138	57	81	55	81	2	--------
Three (or more) doctors only	12	6	6	6	6	--------	--------
Doctors only	2,064	756	1,308	744	1,295	12	13
One hospital only	2,015	964	1,051	915	1,002	49	49
Two hospitals only	172	101	71	97	62	4	9
Three (or more) hospitals only	17	11	6	10	5	1	1
Hospitals only	2,204	1,076	1,128	1,022	1,069	54	59
One doctor—one hospital	863	332	531	326	520	6	11
One doctor—two hospitals	119	45	74	43	67	2	7
One doctor—three (or more) hospitals	7	2	5	1	4	1	1
Two doctors—one hospital	222	73	149	70	146	3	3
Two doctors—two hospitals	31	14	17	14	16	--------	1
Two doctors—three (or more) hospitals	6	2	4	1	3	1	1
Three doctors—one hospital	37	11	26	11	26	--------	--------
Three doctors—two hospitals	6	2	4	2	4	--------	--------
Hospitals and doctors	1,291	481	810	468	786	13	24
Total reported	[3] 5,559	2,313	3,246	2,234	3,150	79	96

[1] Includes 27 cases with color unknown.
[2] 135 doctors who filed joint reports with other doctors were not included in this table. A case reported by either or both of two doctors who filed a joint report is considered as reported by one doctor only (unless reported by some other source).
[3] This figure differs from the total cases by 544, the number of death certificate cases not reported by doctors or hospitals. Data on these were taken from the death certificates.

TABLE 6.—*Distribution of all cases (including reports from death certificates only) by primary site, by sex, color, and (for whites) residence, Allegheny County, Pa., 1937*

Primary site	Total		White						Colored [2]	
			Resident [1]		Nonresident		Total white			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Buccal cavity	288	64	173	38	108	26	281	64	7	--------
Digestive tract	928	690	723	567	161	101	884	668	44	22
Respiratory system	180	55	134	45	40	6	174	51	6	4
Genitourinary system	455	1, 166	325	831	110	281	435	1, 112	20	54
Breast	13	942	7	707	4	217	11	924	2	18
Skin	404	317	267	226	134	83	401	314	8	3
Brain	56	29	35	23	21	6	56	29	--------	--------
Bones	56	43	34	30	18	11	52	41	4	2
All others	187	230	141	151	41	74	182	225	5	5
All sites	2, 567	3, 536	1, 839	2, 618	637	810	2, 476	3, 428	91	108

[1] Includes 27 cases with residence unknown and color unknown.
[2] Eight nonresident colored cases here included with residents.

TABLE 8.—*Number of cases [1] of cancer by age distribution, by sex, color, and (for whites) residence (including cases obtained from death certificate only), Allegheny County, Pa., 1937*

Age group	Total [1]	Male	Female	White				Colored [2]	
				Resident		Nonresident			
				Male	Female	Male	Female	Male	Female
Under 5	20	13	7	8	2	3	5	2	--------
5-9	24	14	10	8	6	6	4	--------	--------
10-14	16	7	9	4	6	3	3	--------	--------
15-19	34	12	22	7	14	5	8	--------	--------
20-24	69	37	32	23	16	10	14	4	2
25-29	102	37	65	24	44	8	20	5	1
30-34	145	48	97	34	66	13	30	1	1
35-39	255	73	182	41	127	25	43	7	12
40-44	384	126	258	75	169	43	73	8	16
45-49	637	229	408	165	296	56	97	8	15
50-54	766	298	468	200	326	91	129	7	13
55-59	801	327	474	236	362	80	99	11	13
60-64	790	357	433	258	325	83	91	16	17
65-69	735	351	384	261	306	82	68	8	10
70-74	604	297	307	239	244	50	58	8	5
75-79	369	192	177	144	142	43	34	5	1
80-84	162	74	88	56	78	18	10	--------	--------
85-89	51	21	30	16	25	4	4	1	1
90 and over	9	3	6	3	6	--------	--------	--------	--------
Age unknown	130	51	79	37	58	14	20	--------	1
Known age	5, 973	2, 516	3, 457	1, 802	2, 560	623	790	91	107
All ages	6, 103	2, 567	3, 536	1, 839	2, 618	637	810	91	108

[1] Includes all reported cases and all cases from death certificate only.
[2] 8 nonresident colored cases are included with residents.

TABLE 9.—*Total number of cases (including report from death certificate only) by primary site and by age groups, males only, white and colored, resident and nonresident combined, Allegheny County, Pa., 1937*

Age group	Primary site									All sites
	Buccal cavity	Digestive tract	Respiratory system	Genito-urinary system	Breast	Skin	Brain	Bones	All others	
Under 5				2		3	1	2	5	13
5–9		3					9	1	1	14
10–14	1	1					1	2	2	7
15–19	1	1		1		3		3	3	12
20–24	2	6		7		5	8	5	4	37
25–29	1	9	2	6		5	5		9	37
30–34	1	14	2	9	1	7	6	3	5	48
35–39	7	18	6	8	1	23	4		6	73
40–44	11	43	17	15		14	6	3	17	126
45–49	24	93	31	24		23	7	8	19	229
50–54	41	118	29	42	3	43	1	3	18	298
55–59	42	133	30	39		53	4	4	22	327
60–64	46	148	27	58	3	42	4	8	21	357
65–69	41	129	14	86	1	60		6	14	351
70–74	33	108	11	75	1	47		3	19	297
75–79	27	60	6	48	3	41		3	4	192
80–84	2	30	1	20		14			7	74
85–89	7	5		4		3			2	21
90 and over		1		1		1				3
Age unknown	1	8	4	10		17		2	9	51
Known age	287	920	176	445	13	387	56	54	178	2,516
All ages	288	928	180	455	13	404	56	56	187	2,567

TABLE 11.—*Total number of cases (including report from death certificate only) by primary site and by age groups, females only, white and colored, resident and nonresident combined, Allegheny County, Pa., 1937*

Age group	Primary site									All sites
	Buccal cavity	Digestive tract	Respiratory tract	Genito-urinary system	Breast	Skin	Brain	Bones	All others	
Under 5	1			1		1	1	1	2	7
5–9			1			1	4	2	2	10
10–14				1			1	5	2	9
15–19		2	2	6	2	1		3	6	22
20–24	2	2		10	6	3	1	2	6	32
25–29		7		27	12	5	2	2	10	65
30–34		11		44	22	3	2	1	14	97
35–39	2	15	1	88	52	9	2		13	182
40–44	1	30	5	103	90	10	1	4	14	258
45–49	7	58	6	149	139	23	3	3	20	408
50–54	8	63	9	186	132	34	3	5	28	468
55–59	5	87	10	154	151	30	6	3	28	474
60–64	8	91	6	139	115	45	1	5	23	433
65–69	11	108	4	111	95	32	2	3	18	384
70–74	7	86	8	81	62	42		2	19	307
75–79	3	70	1	40	30	24		1	8	177
80–84	3	28	1	12	14	23		1	6	88
85–89	4	14		1	3	6			2	30
90 and over		1		1	1	1			2	6
Age unknown	2	17	1	12	16	24			7	79
Known age	62	673	54	1,154	926	293	29	43	223	3,457
All ages	64	690	55	1,166	942	317	29	43	230	3,536

TABLE 13.—*Cases reported, by duration of case, by color, and by vital status, Allegheny County, Pa., 1937*

Duration of case	Number of cases reported									
	Total			Alive			Dead			Unknown
	Grand total	White [1]	Colored	Total alive	White	Colored	Total dead	White	Colored	Total
1 month or less [2]	------	------	------	------	------	------	420	406	14	------
Under 6 months	2,350	2,267	83	1,193	1,162	31	869	824	45	288
6-11 months	1,328	1,293	35	910	890	20	311	297	14	107
12-17 months	588	568	20	446	434	12	130	122	8	12
18-23 months	319	311	8	270	264	6	47	45	2	2
24-29 months	211	203	8	174	168	6	31	29	2	6
30-35 months	126	120	6	107	102	5	17	16	1	2
36-41 months	120	114	6	96	93	3	19	17	2	5
42-47 months	93	90	3	85	82	3	8	8	------	------
48-53 months	70	68	2	62	61	1	6	5	1	2
54-59 months	54	53	1	47	46	1	3	3	------	4
5 years and over	293	289	4	244	241	3	38	37	1	11
Unknown duration	7	7	------	------	------	------	7	7	------	------
Total cases	5,559	5,383	176	3,634	3,543	91	1,486	1,410	76	439

[1] 27 cases of unknown color included with white.
[2] Given here for dead cases only.

TABLE 14.—*Number of cases reported, by duration and by primary site, for alive and dead (excluding 439 cases of unknown vital status, and 7 cases of unknown duration), Allegheny County, Pa., 1937*

Primary site and vital status	One month or less	Under 6	6 to 11	12 to 17	18 to 23	24 to 29	30 to 35	36 to 41	42 to 47	48 to 53	54 to 59	60 and over
Buccal cavity:												
Alive	(1)	76	73	32	18	19	17	10	9	9	4	20
Dead	*8*	*27*	*18*	*7*	*4*	------	*4*	*3*	------	------	------	------
Digestive tract:												
Alive	(1)	261	159	59	31	19	11	9	15	4	9	26
Dead	*226*	*432*	*100*	*32*	*11*	*9*	*2*	*9*	*1*	*2*	------	*8*
Respiratory system:												
Alive	(1)	51	33	6	3	2	------	1	2	------	------	4
Dead	*21*	*50*	*24*	*7*	*1*	*2*	*1*	*2*	------	------	------	*1*
Genitourinary system:												
Alive	(1)	323	235	137	84	58	29	23	24	15	17	58
Dead	*86*	*189*	*96*	*43*	*17*	*10*	*6*	*2*	*3*	*3*	*1*	*7*
Breast:												
Alive	(1)	174	166	79	55	37	28	24	16	23	9	76
Dead	*21*	*56*	*39*	*29*	*7*	*6*	*2*	*3*	*4*	*1*	*2*	*16*
Skin:												
Alive	(1)	197	159	94	57	27	13	20	14	8	4	50
Dead	*4*	*8*	*8*	*3*	*3*	*1*	------	------	------	------	------	*2*
Brain:												
Alive	(1)	14	6	------	1	1	1	------	1	------	------	------
Dead	*20*	*32*	*3*	------	*1*	------	------	------	------	------	------	------
Bones:												
Alive	(1)	14	17	7	7	1	------	------	------	------	------	1
Dead	*7*	*19*	*9*	*3*	*1*	------	*1*	------	------	------	------	*1*
All others:												
Alive	(1)	83	62	32	14	10	8	9	4	3	4	9
Dead	*27*	*56*	*14*	*6*	*2*	*3*	*1*	------	------	------	------	*3*
All sites:												
Alive	(1)	1,193	910	446	270	174	107	96	85	62	47	244
Dead	*420*	*869*	*311*	*130*	*47*	*31*	*17*	*19*	*8*	*6*	*3*	38

[1] Less than 1 month listed for dead cases only. This is part of the duration group under 6 months.

TABLE 15.—*Number of cases under observation only during 1937, by months since last treated, by primary site, with total cases reported, Allegheny County, Pa., 1937*

Primary site	Number of cases by months since last treated for all cases observed only during 1937											Total numbe of reported cases, including treated cases
	Under 12	12-23	24-35	36-47	48-59	60-71	72-83	84-95	96 and over	Unknown	Total	
Buccal cavity	40	25	8	2	3	1	------	------	------	7	86	368
Digestive tract	44	18	5	5	4	1	3	2	5	27	114	1,316
Respiratory system	2	------	------	------	------	------	------	------	------	5	7	206
Genitourinary system	111	36	14	14	6	4	4	3	6	17	215	1,513
Breast	77	29	14	16	7	7	5	1	13	24	193	916
Skin (except lip)	92	28	13	6	4	2	1	2	1	13	162	709
Brain	------	------	1	------	------	------	------	------	------	------	1	73
Bones (except jaw)	4	------	------	------	------	------	------	------	------	2	6	94
All others	27	8	3	3	1	1	------	------	------	9	52	364
All sites	397	144	58	46	25	16	13	8	25	104	836	5,559

TABLE 17.—*Number of cases of cancer first seen in 1937, by age, sex, color, and (for whites) residence, Allegheny County, Pa.*

Age group	Total cases first seen in 1937		White				Colored[1]	
			Resident		Nonresident			
	Male	Female	Male	Female	Male	Female	Male	Female
Under 5	7	5	5	1	2	4	------	------
5-9	10	5	5	4	5	1	------	------
10-14	4	7	2	5	2	2	------	------
15-19	7	14	3	8	4	6	------	------
20-24	25	20	13	9	8	9	4	2
25-29	23	35	15	23	5	12	3	------
30-34	25	55	16	41	9	14	------	------
35-39	46	111	23	74	18	32	5	5
40-44	81	134	45	90	31	38	5	6
45-49	132	202	87	144	38	53	7	5
50-54	186	229	130	153	52	68	4	8
55-59	196	253	136	187	53	60	7	6
60-64	213	234	150	167	52	57	11	10
65-69	205	207	148	158	55	45	2	4
70-74	178	170	143	123	32	43	8	4
75-79	109	86	79	65	30	20	------	1
80-84	40	41	31	33	9	8	------	------
85-89	8	17	6	11	2	5	------	1
90 and over	2	1	2	1	------	------	------	------
Unknown age	30	61	28	44	11	16	------	1
All ages	1,536	1,887	1,067	1,341	418	493	51	53

[1] Regardless of residence. All except 5 of these cases are residents.

TABLE 18.—*Number of cases of cancer first seen in 1937, by primary site, sex, color, and (for whites) residence, Allegheny County, Pa.*

Primary site	Total cases first seen in 1937		White				Colored [1]	
			Resident		Nonresident			
	Male	Female	Male	Female	Male	Female	Male	Female
Buccal cavity	147	52	88	31	55	21	4	-------
Digestive tract	591	370	440	290	122	73	29	11
Respiratory system	126	31	90	23	33	6	3	2
Genitourinary system	271	619	191	425	74	168	6	26
Breast	9	447	5	325	8	113	1	9
Skin (except lip)	208	186	133	128	73	58	2	-------
Brain	46	20	26	10	20	4	-------	-------
Bones (except jaw)	35	29	21	20	11	7	3	2
All others	103	127	73	83	27	41	3	3
All sites	1,536	1,887	1,067	1,341	418	493	51	53

[1] Five are nonresidents. The remaining 99 are residents.

PUBLIC HEALTH SERVICE PUBLICATIONS

A List of Publications Issued During the Period January–June 1940

There is printed herewith a list of publications of the United States Public Health Service issued during the period January–June 1940.

The purpose of the publication of this list is to provide a complete and continuing record of Public Health Service publications, for reference use by librarians, scientific workers, and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free public distribution.

Those publications marked with an asterisk (*) can be obtained only by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the prices noted.

Periodicals

*Public Health Reports (weekly), January–June, vol. 55, Nos. 1 to 27, pages 1 to 1191. 5 cents a number.

*Venereal Disease Information (monthly), January–June, vol. 21, Nos. 1 to 6, pages 1 to 204. 5 cents a number.

Reprints From the Public Health Reports

2126. Mortality rates and economic status in rural areas. By Harold F. Dorn. January 5, 1940. 9 pages.

2127. The effect of sulfapyridine and sulfanilamide with and without serum in experimental meningococcus infection. By Sara E. Branham. January 5, 1940. 14 pages.

2128. Rocky Mountain spotted fever. Treatment of infected laboratory animals with immune rabbit serum. By Norman H. Topping. January 12, 1940. 6 pages.

2129. Cases and days of illness among males and females with special reference to confinement to bed. Based on 9,000 families visited periodically for 12 months, 1928–31. By Selwyn D. Collins. January 12, 1940. 47 pages.
2130. Epidemic and endemic typhus: Protective value for guinea pigs of vaccines prepared from infected tissues of the developing chick embryo. By Herald R. Cox and E. John Bell. January 19, 1940. 6 pages.
2131. The pathology of poliomyelitis experimentally induced in the eastern cotton rat, *Sigmodon hispidus hispidus*. By R. D. Lillie and Charles Armstrong. January 19, 1940. 4 pages; 4 plates.
2132. *Anopheles walkeri* (Theobald): A wild-caught specimen harboring malarial plasmodia. By F. B. Bang, G. E. Quinby, and T. W. Simpson. January 19, 1940. 2 pages; 1 plate.
2133. Report on market-milk supplies of certain urban communities. January 1, 1938–December 31, 1939. January 19, 1940. 5 pages.
2134. The disabling diseases of childhood. Their characteristics and medical care as observed in 500,000 children in 83 cities canvassed in the National Health Survey, 1935–1936. I. Characteristics and leading causes. By Dorothy F. Holland. January 26, 1940. 22 pages.
2135. Ocular manifestations of ariboflavinosis. By H. D. Kruse, V. P. Sydenstricker, W. H. Sebrell, and H. M. Cleckley. January 26, 1940. 13 pages.
2136. Community economic status and the dental problem of school children. By Henry Klein and Carroll E. Palmer. February 2, 1940. 20 pages.
2137. The disabling diseases of childhood. Their characteristics and medical care as observed in 500,000 children in 83 cities canvassed in the National Health Survey, 1935–1936. II. Medical and nursing care. By Dorothy F. Holland. February 9, 1940. 18 pages.
2138. The bacterial assay of riboflavin in the urine and tissues of normal and depleted dogs and rats. By H. F. Fraser, N. H. Topping, and H. Isbell. February 16, 1940. 10 pages.
2139. A further study of the mode of action of methylcholanthrene on normal tissue cultures. By Wilton R. Earle and Carl Voegtlin. February 23, 1940. 20 pages; 9 plates.
2140. A study of pneumococcus typing serums for the purpose of standardizing a test for potency. By Bernice E. Eddy. March 1, 1940. 15 pages; 1 plate.
2141. Yellow fever. By J. H. Bauer. March 1, 1940. 9 pages.
2142. Studies of sewage purification. XI. The removal of glucose from substrates by activated sludge. By C. C. Ruchhoft, J. F. Kachmar, and W. Allan Moore. March 8, 1940. 30 pages.
*2143. The National Health Survey. Some general findings as to disease, accidents, and impairments in urban areas. By Rollo H. Britten, Selwyn D. Collins, and James S. Fitzgerald. March 15, 1940. 27 pages. 5 cents.
2144. Using tests as a medium for health education. By Mayhew Derryberry and Arthur Weissman. March 22, 1940. 5 pages.
2145. Siphonaptera: Notes on two California species. By Wm. L. Jellison. March 22, 1940. 4 pages.
2146. *Ornithodoros hermsi:* Feeding and molting habits in relation to the acquisition and transmission of relapsing fever spirochetes. By Gordon E. Davis and Mary E. Walker. March 22, 1940. 12 pages.

2147. Attempts to produce tumors in rats by feeding crude wheat germ oil made by prolonged ether extraction. By Harold Blumberg. March 29, 1940. 8 pages.
2148. Factors influencing carcinogenesis with methylcholanthrene. III. The effect of solvents. By Michael B. Shimkin and Howard B. Andervont. March 29, 1940. 9 pages.
2149. Studies of sewage purification. XII. Metabolism of glucose by activated sludge. By C. C. Ruchhoft, J. F. Kachmar, and O. R. Placak. April 5, 1940. 20 pages.
2150. Neglected opportunities for teamwork in county health department practice. By J. O. Dean and Evelyn Flook. April 5, 1940. 10 pages.
2151. Geographical distribution of diphtheria mortality in the United States. By C. C. Dauer. April 12, 1940. 8 pages.
2152. The incidence of cancer in Cook County, Illinois, 1937. By Harold F. Dorn. April 12, 1940. 24 pages.
2153. Tularaemia (rabbit fever). April 19, 1940. 4 pages.
2154. Effect of petroleum ether extract of mouse carcasses on skin tumor production in C57 black mice. By John J. Morton and G. Burroughs Mider. April 19, 1940. 8 pages.
2155. *Bacterium tularense:* Its persistence in the tissues of the argasid ticks *Ornithodoros turicata* and *O. parkeri.* By Gordon E. Davis. April 19, 1940. 5 pages.
2156. Ticks (*Ornithodoros* spp.) in Arizona bat "caves." By Cornelius B. Philip. April 19, 1940. 4 pages.
2157. Studies on trichinosis. VIII. The antigenic phase of trichinosis. By John Bozicevich and Laszlo Detre. April 19, 1940. 10 pages.
2158. A highly virulent strain of Rocky Mountain spotted fever virus isolated in the eastern United States. By Norman H. Topping and R. E. Dyer. April 26, 1940. 4 pages.
2159. Studies on the toxins and antitoxins of *Clostridium perfringens.* By Sarah E. Stewart. May 3, 1940. 23 pages.
2160. Existence and use of hospital facilities among the several States in relation to wealth as expressed by per capita income. By Elliott H. Pennell, Joseph W. Mountin, and Kay Pearson. May 10, 1940. 25 pages.
2161. Duration of illness from specific diseases among 9,000 families, based on Nation-wide periodic canvasses, 1928–31. By Selwyn D. Collins. May 17, 1940. 33 pages.
2162. The determination of V factor in the urine and tissues of normal dogs and of dogs with blacktongue by the use of *Hemophilus parainfluenzae.* By Margaret Pittman and H. F. Fraser. May 24, 1940. 11 pages.
2163. Two new species of Argasidae (Acarina: Ixodoidea). By R. A. Cooley and Glen M. Kohls. May 24, 1940. 9 pages; 1 plate.
2164. Prevalence of poliomyelitis in the United States in 1939. By C. C. Dauer. May 31, 1940. 7 pages.
2165. The course of disabling morbidity among industrial workers, 1921–38. By William M. Gafafer. May 31, 1940. 13 pages.
2166. Studies of sewage purification. XIII. The biology of *Sphaerotilus natans* Kutzing in relation to bulking of activated sludge. By James B. Lackey and Elsie Wattie. May 31, 1940. 13 pages; 3 plates.
2167. Studies in childbirth mortality. I. Puerperal fatality and loss of offspring. By J. Yerushalmy, M. Kramer, and E. M. Gardiner. June 7, 1940. 18 pages.
2168. Leprosy: Vitamin B_1 deficiency and rat leprosy. By L. F. Badger, E. Masunaga, and D. Wolf. June 7, 1940. 14 pages.

2169. Disinsectization of aircraft. By C. L. Williams. June 7, 1940. 6 pages; 2 plates.
2170. Trapping rats on ships. June 14, 1940. 5 pages.
2171. Immunity to the Lansing strain of poliomyelitis as revealed by the protection test in white mice. By V. H. Haas and Charles Armstrong. June 14, 1940. 8 pages; 1 plate.
2172. Studies on trichinosis. XIV. A survey of municipal garbage disposal methods as related to the spread of trichinosis. By Willard H. Wrignt. June 14, 1940. 9 pages.
2173. Occupational leukoderma. By Louis Schwartz, Edward A. Oliver, and Leon H. Warren. June 21, 1940. 20 pages; 8 plates.
2174. Disabling morbidity among male and female employees in mail-order stores, 1930–34, inclusive. By Hugh P. Brinton and Elizabeth S. Frasier. June 28, 1940. 15 pages.

Supplements to the Public Health Reports

152. The work of the United States Public Health Service. 1940. 82 pages.
158. Studies on codeine addiction. By C. K. Himmelsbach, Howard L. Andrews, Robert H. Felix, Fred W. Oberst, and Lowrey F. Davenport. 1940. 67 pages.
159. Regional differences in the hospitalization and care of patients with mental diseases. By Joseph Zubin and Grace C. Scholz. 1940. 94 pages.
160. The notifiable diseases. Prevalence during 1938 in States. 1940. 13 pages.
161. Ivy and sumac poisoning. 1940. 8 pages; 2 plates.

Public Health Bulletins

247. Chronic manganese poisoning in an ore-crushing mill. By Robert H. Flinn, Paul A. Neal, Warren H. Reinhart, J. M. DallaValle, William B. Fulton, and Allan E. Dooley. 1940. 77 pages; 1 halftone.
249. Skin hazards in American industry. Part III. By Louis Schwartz. 1939. 93 pages; 22 halftones.
250. Pneumoconiosis among mica and pegmatite workers. By Waldemar C. Dreessen, J. M. DallaValle, Thomas I. Edwards, R. R. Sayers, H. F. Easom, and M. F. Trice. 1940. 74 pages; 17 halftones.
252. Cancer mortality in the United States. II. Recorded cancer mortality in geographic sections of the death registration States of 1920, from 1920 to 1935. By Mary Gover. 1940. 74 pages.
253. The relative toxicity of lead and some of its common compounds. By Lawrence T. Fairhall and R. R. Sayers. With a section on pathology by J. W. Miller. 1940. 40 pages; 6 halftones; 1 lithograph.

National Institute of Health Bulletin

173. I. Leprosy: Two strains of acid-fast bacilli isolated from a case of human leprosy. A comparison with other strains of acid-fast organisms with particular reference to the Lleras bacillus. By L. F. Badger, D. W. Patrick, G. L. Fite, and Don Wolfe. II. Leprosy: The pathology of experimental rat leprosy. By G. L. Fite. III. Leprosy: Variations in the virulence of strains of rat leprosy. By L. F. Badger and G. L. Fite. 1940. 83 pages; 8 halftones.

Unnumbered Publications

Index to Public Health Reports, volume 54, part 2, July–December 1939. 29 pages.

National Negro Health Week program. This pamphlet is published annually usually about the middle of March, for community leaders in an effort to suggest ways and means by which interested individuals and organizations may be organized for a concerted and effective attack upon the community's disease problems. Twenty-sixth observance, March 31–April 7, 1940. 16 pages.

National Negro Health Week poster. Twenty-sixth observance. 1940.

National Negro Health Week leaflet. Twenty-sixth observance. 1940. 2 pages.

Annual Report

Annual Report of the Surgeon General of the United States Public Health Service for the fiscal year 1939. 185 pages.

Reprints From Venereal Disease Information

120. Syphilis control. Principles of case finding and case holding. By Helen E. Woods. Vol. 20, December 1939. 6 pages.
121. Progress in venereal disease control during fiscal year 1939. Vol. 20, December 1939. 3 pages.
122. Illegal and unethical practices in the diagnosis and treatment of syphilis and gonorrhea. By Mary S. Edwards and Paul M. Kinsie. Vol. 21, January 1940. 10 pages.
123. An evaluation of the spirochete complement fixation reaction in comparison with the Eagle flocculation and Wassermann procedures. By Paul T. Erickson and Harry Eagle. Vol. 21, February 1940. 7 pages.
124. Serologic consultation service for State and other laboratories. By John A. Kolmer. Vol. 21, February 1940. 4 pages.
125. A mechanical system for record keeping of morbidity, treatment progress, and control of venereal diseases. By Lida J. Usilton. Vol. 21, March 1940. 7 pages.
126. The culture method in the diagnosis of gonorrhea. Presentation of a new medium. By Anne C. Pitts. Vol. 21, March 1940. 8 pages.
127. Address given at the annual meeting of the American Social Hygiene Association, Chicago, February 1, 1940. By Nathan B. Van Etten. Vol. 21, April 1940. 4 pages.
128. Intrastate evaluation study of the performance of serologic tests for syphilis in Georgia, 1939. By E. L. Webb, T. F. Sellers, and L. E. Burney. Vol. 21, April 1940. 5 pages.

Supplement to Venereal Disease Information

7. Syphilis in Mother and Child. 20 pages.

Venereal Disease Folder

6. Are you being played for a sucker? 6 pages.

Venereal Disease Bulletin

93. 20 questions on gonorrhea. 23 pages.

Venereal Disease Posters

7. No home remedy or quack doctor ever cured syphilis or gonorrhea.
8. Syphilis. 100,000 new victims each year.
9. Face the facts about syphilis.

CARE OF THE EYES AND THE PREVENTION OF BLINDNESS [1]

Protection of the Eye.

The eye is one of the most delicate as well as one of the most important organs of the body and nature has sought in numerous ways to safeguard it from injury. The bony frame and socket form a rigid wall around it, and the eyelids and other soft parts cushion it against jarring and injury from all except direct blows. The sensitiveness of the cornea (covering of the visible portion of the eyeball) gives instant notice of the presence of foreign bodies and tears wash away many of the offending particles which constantly get into the sacs formed by the overhanging lids.

Care of the Eyes.

General.—Enough light, properly used, is one of the important factors in the care of the eyes. Shadows as well as glare cause eye strain and must be reduced to a minimum. Resting the eyes for short periods, by closing them or by directing the vision at distant objects, will relieve the strain of continuous close eye work. Material being read is best held near the level of the eye. Tinted glasses are helpful when using the eyes in strong sunlight, but the habit of wearing dark glasses should not be formed.

At birth.—The eyes of the newborn may become infected with germs from the birth canal. Ophthalmia neonatorum, a serious eye infection due to the gonococcus, was at one time a common cause of blindness. Preventive drops, placed in the eyes of babies immediately after birth, have lessened considerably the number of such cases of blindness. In most States these eye drops are supplied by the health departments without cost to physicians and midwives who are required by law to use them on every newborn baby in their care.

During infancy.—In infancy, the eyes should be protected against long exposure to direct light, either sun or artificial. Toys with points and sharp edges may cause serious damage to an infant's eyes.

During childhood.—It has been estimated that 10 percent of children entering school for the first time have uncorrected defects of vision. Since these visual defects interfere with educational progress, it is important that the eyes of the preschool child be examined in time for correcting glasses to be applied, if needed, before the burden of school work is taken up. In every school an effort should be made to provide sufficient light, without glare. This is best accomplished with properly designed and placed windows.

It is important at this stage of life to teach children the danger of rubbing the eyes with dirty hands.

During adolescence.—Since the eyes are used with increasing severity during school life, it is important to reexamine them at intervals as

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[1] This material is available in leaflet form and may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

the pressure of the educational program increases. A minor defect which may have escaped the examiner when a child enters school may become intensified as night study periods are extended.

During middle life.—After the onset of middle life, failing vision is commonly experienced. Ordinarily this is due to natural physical changes in the eye. Reading and other work ordinarily seen best at a distance of about 13 inches must now be viewed at a longer range.

In middle age the eye should never be considered separately from the body as a whole. Failing vision may be the first symptom of some serious bodily disorder which can be detected through a careful physical examination including an eye examination.

In industry.—Certain occupations are particularly hazardous to the eyes. Corrosive solutions may be splashed, or a variety of dangerously abrasive particles may be thrown into the eyes by grinding or chipping tools. Goggles of an approved pattern should be worn by workmen who weld metals, who use high speed grinding tools, or who use mechanical chipping implements.

Cross Eyes.

Cross eyes (squint) is dangerous, as the condition results in one eye doing all the work. This may occur by the use of one eye continuously and nonuse of the other eye, or by the alternating use of each eye. In the first instance, the eye which is not in use becomes weaker and weaker; in the second instance, both eyes may retain their normal vision, but the individual sees with only one eye at a time while the image of the opposite eye is suppressed. In either case, this is nature's effort to prevent double vision, which would be the case if each eye saw equally well at the same time. If untreated, cross eyes invariably leads to monocular (one-eyed) vision.

The average infant may appear to be cross-eyed, but if this squint remains after 1 year, an abnormal condition is present.

In only a few instances may cross eyes be corrected by proper glasses. More frequently, orthoptic training (special exercises of the eye muscles), or surgery, or a combination of both, may be necessary. The earlier a child is placed under treatment for cross eyes, the better the outlook for the child to recover and develop the ability to see equally well with both eyes at the same time (binocular vision with fusion). For the adult, the outlook is not so favorable, but benefit can be obtained.

Some Refractive Errors.

1. *Nearsightedness (myopia).*—In myopia the axis of the eyeball is abnormally long. Such an eye at rest is focused for near objects, whereas the normal eye at rest is focused at infinity. Far objects will be blurred in individuals with nearsightedness.

2. *Farsightedness (hyperopia).*—In this condition the axis of the eyeball is too short. Constant effort of the eye muscles is necessary

to focus for near objects, and this causes eyestrain. Farsightedness more frequently becomes manifest after the age of 40, owing to loss of the accommodative power of the eye.

3. *Astigmatism.*—Astigmatism (blurred image) is caused by an irregularity in the curvature of the cornea.

Wearing Glasses.

Every person who puts on correcting glasses has to pass through a period of vision adjustment. Some time is required for the individual to adapt himself to the change in size, clarity, and position of objects seen, brought about by glasses.

Foreign Bodies in the Eye.

No person who lacks special training should ever attempt to remove a foreign body from the surface of the eyeball. It is safer, pending the arrival of expert attention, to avoid further damage to the eye by covering it with a moist compress of gauze or a clean handkerchief. The eye must not be rubbed and movement of the eyelids and eyeball must be restricted.

Preventive Measures.

1. Periodic eye examinations: Before going to school, at intervals during school life and more frequently as age advances.
2. Prompt treatment by qualified specialists in defects and diseases of the eye.
3. Sight-saving classes—devised to meet the particular needs of those individuals with eye disorders which prevent them from progressing in their school work.
4. Education of the public in the conservation of vision.
5. Cultivation of good eye habits:
   - Proper reading posture.
   - Occasional periods of rest during prolonged reading.
   - Adequate light and avoiding glare.
   - Avoid reading very fine print and print on poor quality paper.
6. Do not allow children to play with sharp instruments or toys which may cause serious injury to the eyes.

NOTE: For comfortable reading, print should be held below the level of the eyes and from 16 to 18 inches away from the eyes.

Persons Engaged in Eye Work.

1. *Ophthalmologist* and *oculist* are synonymous terms, the former derived from the Greek, and the latter from the Latin. Both terms refer to a physician (M. D.) who specializes in optical defects and diseases and in the surgery of the eye.
2. *Optometrist* is the name applied to the nonmedical practitioner who corrects refractive errors (the need of glasses) and muscular defects of the eye without the aid of drugs or surgery.

3. *Optician* is the name applied to one who grinds glasses, fits them into frames, and adjusts the frames to the face of the wearer.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT. CONSULT YOUR DOCTOR

PNEUMOCONIOSIS AMONG MICA AND PEGMATITE WORKERS [1]

A REVIEW

An evaluation of the working environment and study of pneumoconiosis among workmen engaged in the mining, milling, and fabricating of mica, feldspar, quartz, and kaolin is the subject of Public Health Bulletin No. 250. It is a report of an investigation carried out in western North Carolina by the Public Health Service in cooperation with the Division of Industrial Hygiene of the North Carolina State Board of Health. The working environment of 1,138 men and 105 women employed in 14 mines, 9 grinding plants, 3 china clay plants, and 2 mica-fabricating plants, who were the subjects of medical study, was investigated by engineers.

The bulletin contains an appendix by J. M. DallaValle on averaging and weighting of dust exposures and an appendix by J. W. Miller, reporting response of peritoneal tissue to samples of these particular mineral dusts. A description of industrial processes, uses of the minerals, results of engineering and medical studies, brief case reports of nine cases with active or arrested reinfection tuberculosis, and recommendations for the control of the dust hazard are included.

Ten cases of pneumoconiosis were found on examination of 57 men exposed to mica dust generated by grinding hand-sorted mica and mica scrap which contained almost no free silica. The signs and symptoms resembled those of silicosis, but by X-ray the pattern of the lung field markings seemed to differ qualitatively from silicosis, showing fine close-set stippled markings with basal localization and tendency to a coalescence of shadows in some cases. No cases of pneumoconiosis were found among 31 men and 78 women engaged in fabricating sheet mica under conditions that generated approximately 3,000,000 dust particles per cubic foot.

Twenty-three cases of silicosis were found on examination of 741 men exposed to the mixture of dusts. No cases of silicosis were found among workmen whose dust exposure did not exceed 10,000,000 particles per cubic foot for the periods of employment represented.

[1] Public Health Bulletin No. 250, Pneumoconiosis Among Mica and Pegmatite Workers. By Waldemar C. Dreessen, J. M. DallaValle, Thomas I. Edwards, R. R. Sayers, H. F. Easom, and M. F. Trice. Available from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents per copy.

Although no cases of pneumoconiosis were found among 95 men with kaolin exposure, the data were inadequate to appraise the pneumoconiosis potentialities of this dust because of relatively short employment periods in concentrations exceeding 10,000,000 particles per cubic foot.

Equipment and practices are described which have effectively reduced dust exposure to safe limits in similar operations in other industries.

STAPLETON MARINE HOSPITAL ENLARGED

An extension to the Stapleton, N. Y., Marine Hospital constructed at a cost of more than $1,100,000 and providing 305 additional beds and other facilities was opened and occupied on July 2. A new modern building for this hospital was completed December 11, 1935, at a cost of approximately $2,337,525, providing about 564 beds. The present addition brings the capacity of the hospital to a total of a little more than 1,000 beds, including 149 beds in the old building.

The hospital at Stapleton is now the largest and one of the most modern marine hospitals of the Public Health Service. It provides medical, surgical, psychiatric, and other special professional care annually to more than 50,000 patients, legal beneficiaries of the Service.

There is also a research group at this institution which specializes in the study of methods for the better diagnosis and treatment of venereal diseases. These researches not only guarantee a high standard of serologic and therapeutic technique for the patients at this institution and all other Service beneficiaries, but the results are made available to the entire medical profession.

The care of sick and disabled American merchant seamen by the Federal Government was undertaken at the port of New York soon after the passage of the act of 1798 creating the marine hospitals; but the actual establishment of a United States marine hospital there was delayed until long after other ports of less commercial importance, such as Boston, Chicago, San Francisco, and New Orleans, were provided with such institutions. This was no doubt due to the fact that other organizations were providing hospital and medical care for sailors at that port, and facilities for the care of seamen were readily available by contract.

In 1754 the colonial government of New York established quarantine and imposed a tax on all seamen and passengers entering the port to secure funds for constructing hospital buildings, first on Governors Island, and later on Bedloe Island. The tax thus collected was paid into the "Mariners' Fund," which was administered by the Commissioner of Health of New York City. Some of these funds were subsequently devoted to purposes other than relief for

seamen, and the State legislature in 1831 created a board of trustees to employ the money exclusively for the care of seamen in the New York Hospital and a marine hospital on Staten Island called the Seamen's Retreat. In April 1770, the Marine Society of the City of New York was granted a charter. In addition to certain special functions relating to navigation, the society engaged in many charitable activities. This society was the forerunner of "Sailors' Snug Harbor," which was founded about 1806.

Prior to 1879, beneficiaries of the Marine Hospital Service at the port of New York were cared for at the local hospitals under contract. In that year 11 different hospitals in New York City, Brooklyn, and Jersey City were under contract with the Marine Hospital Service. In the same year the War Department hospital station on Bedloe Island, having been abandoned, was turned over to the Treasury Department for temporary use as a marine hospital, and was so used until 1883, when it became necessary to vacate the island for the erection of the Statue of Liberty.

In the latter year, a lease of the Seamen's Retreat, at Stapleton, Staten Island, was obtained for 2 years from the Marine Society of New York, with the privilege of purchase at a stipulated price during that period, and the patients were transferred there from Bedloe Island. The lease was renewed from time to time until the property was finally purchased by the Government in 1902. It is here that the present United States Marine Hospital is located.

The present reservation contains about 9¾ acres, and is desirably situated for hospital purposes. The grounds have a gentle slope toward the water, providing a delightful vista of New York Harbor.

COURT DECISION ON PUBLIC HEALTH

Statute creating a board of health for a particular county alone held violative of constitution.—(North Carolina Supreme Court; *Sams et al.* v. *Board of County Com'rs of Madison County et al.*, 7 S. E. 2d 540; decided March 20, 1940.) A public-local law, passed by the State legislature in 1931, created for Madison County alone a county board of health. The principal duty of the board was to elect a county physician and quarantine officer, for whom was prescribed the duty of inspecting county institutions and seeing that they were kept in a sanitary condition. The board was also authorized by the act to select a physician to vaccinate against disease.

By the State constitution the legislature was prohibited from passing "any local, private, or special act * * * relating to health, sanitation, and the abatement of nuisances," and it was expressly ordained that any local or special act passed in violation of the pr-

hibition should be void, as power was given the legislature to pass general laws regulating the matters referred to.

The plaintiff instituted an action to enforce the payment to him of the salary of county physician and quarantine officer, to which office he alleged he had been elected by the county board of health as constituted under the provisions of the above-mentioned local law. In holding that the plaintiff's action, based on such law, could not be maintained, the supreme court said that it was apparent that the act was local and that it related to health and sanitation, thus being void because coming within the prohibition of the constitutional provision referred to. "Furthermore," stated the court, "the act is in conflict with the State-wide policy as contemplated by the constitution and established by general laws regulating the composition of county boards of health throughout the State and the election of county physicians." It was also pointed out that validity could not be given to the acts, as de facto officers, of the persons named as members of the county board of health under the local act for the reason that it was found as a fact that the de jure board of health for Madison County, constituted in accordance with the provisions of a general statute and acting as such, had in April 1937 elected another person as county physician and quarantine officer, who performed services and was recognized by the board of county commissioners as such.

DEATHS DURING WEEK ENDED JULY 27, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 27, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,855	7,219
Average for 3 prior years	7,173	
Total deaths, first 30 weeks of year	262,759	258,662
Deaths under 1 year of age	544	432
Average for 3 prior years	450	
Deaths under 1 year of age, first 30 weeks of year	15,126	15,385
Data from industrial insurance companies:		
Policies in force	65,055,291	66,918,398
Number of death claims	11,718	11,747
Death claims per 1,000 policies in force, annual rate	9.4	9.2
Death claims per 1,000 policies, first 30 weeks of year, annual rate	10.0	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 3, 1940

Summary

Current reports indicate little change in the favorable conditions which have obtained so far this year with reference to the 9 important communicable diseases reported weekly to the Public Health Service by the State health authorities. Poliomyelitis, smallpox, and whooping cough show increases as compared with last week, while influenza and measles are higher than during the corresponding week last year and the 5-year (1935–39) median expectancy.

The number of cases of poliomyelitis increased from 136 to 195 as compared with the preceding week, increases being shown in all geographic areas except the Middle Atlantic and Pacific States. The 5-year median for the corresponding week is 210.

Twenty cases of Rocky Mountain spotted fever were reported, of which 6 occurred in western States. Six cases of undulant fever were reported, 2 cases of tularaemia (in Utah), and 46 cases of endemic typhus fever, 12 of which occurred in Alabama and 9 each in Florida, Georgia, and Texas.

For the current week the Bureau of the Census reports 8,763 deaths in 88 major cities, as compared with 8,855 for the preceding week and with a 3-year (1937–39) average of 7,258 for the corresponding week. In connection with the sharp rise during the last 2 weeks in the number of deaths in these cities, due no doubt to excessive temperatures, it is of interest to note that, according to the U. S. Weather Bureau, the severest heat waves throughout the larger part of the United States occur about 30 days after the summer solstice.

Telegraphic morbidity reports from State health officers for the week ended August 3, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39
	Aug. 3, 1940	Aug. 5, 1939		Aug. 3, 1940	Aug. 5, 1939		Aug. 3, 1940	Aug. 5, 1939		Aug. 3, 1940	Aug. 5, 1939	
NEW ENG.												
Maine	0	0	1	------	------	------	44	16	25	0	1	0
New Hampshire	0	0	0	------	------	------	0	3	3	0	0	0
Vermont	0	0	0	------	------	------	10	14	13	0	0	0
Massachusetts	2	2	6	------	------	------	315	128	81	0	0	3
Rhode Island	0	0	0	------	------	------	29	18	7	0	0	0
Connecticut	0	0	1	1	------	------	9	22	18	2	1	0
MID. ATL.												
New York	7	19	20	[1] 4	[1] 2	[1] 1	351	234	261	1	4	9
New Jersey	4	3	3	1	3	1	200	16	73	0	0	0
Pennsylvania	5	24	18	------	------	------	151	40	117	3	3	3
E. NO. CEN.												
Ohio	4	11	11	6	3	8	22	21	79	0	0	3
Indiana [2]	5	7	7	2	------	------	10	2	2	1	0	1
Illinois	12	6	18	6	1	3	93	15	25	0	1	5
Michigan [3]	5	5	7	4	11	------	193	42	68	0	0	1
Wisconsin	0	0	2	8	26	23	285	0	38	1	2	1
W. NO. CEN.												
Minnesota	0	1	2	2	------	1	18	15	18	1	0	0
Iowa	1	1	2	------	------	1	30	31	8	3	0	0
Missouri [3]	0	1	7	------	------	23	3	1	5	0	0	1
North Dakota	1	2	3	------	5	2	1	0	2	0	0	0
South Dakota	4	1	1	------	------	------	3	1	0	0	0	0
Nebraska	0	2	1	------	------	------	6	1	2	0	0	0
Kansas [4]	5	1	2	1	1	1	15	4	7	1	1	1
SO. ATL.												
Delaware [2]	0	0	0	------	------	------	1	0	0	0	0	0
Maryland [2] [3]	1	1	4	1	1	1	6	8	13	0	1	1
Dist. of Col. [2]	3	0	4	------	------	------	2	5	5	0	0	1
Virginia [4]	21	27	15	15	16	------	43	35	21	0	0	2
West Virginia [3]	3	1	3	2	6	12	6	8	8	1	1	0
North Carolina [2] [4]	9	11	11	------	------	------	26	23	23	1	3	2
South Carolina [4]	8	8	8	116	67	45	19	0	6	1	0	1
Georgia [4]	1	16	16	3	18	------	11	18	0	1	2	2
Florida [4]	4	6	4	------	1	1	6	4	2	0	0	0
E. SO. CEN.												
Kentucky	5	11	3	1	8	1	41	2	5	2	2	2
Tennessee [4]	1	4	6	6	12	6	9	6	7	0	1	1
Alabama [4]	9	22	13	5	15	5	30	1	1	0	1	1
Mississippi [3] [4]	2	11	10	------	------	------	------	0	------	2	1	0
W. SO. CEN.												
Arkansas	2	5	5	15	5	5	2	3	3	0	1	0
Louisiana [4]	3	5	9	2	9	10	2	3	3	0	0	0
Oklahoma	2	8	5	9	4	5	1	3	3	0	0	0
Texas [4]	14	21	26	137	23	24	70	34	19	1	5	2
MOUNTAIN												
Montana [3]	6	2	1	------	4	------	17	12	12	1	0	0
Idaho	1	0	0	------	------	1	4	4	4	0	0	0
Wyoming [3]	1	1	0	------	------	------	3	7	3	0	0	0
Colorado [2] [5]	7	11	9	------	7	------	5	9	12	0	0	0
New Mexico	0	0	2	------	------	------	14	2	2	0	1	0
Arizona	1	1	1	14	4	5	13	2	2	0	0	0
Utah [3]	0	0	0	------	2	------	19	12	12	0	0	0
PACIFIC												
Washington	1	0	1	------	------	------	7	72	22	0	0	0
Oregon [2]	1	0	1	------	3	8	13	27	15	0	0	0
California [4]	8	19	16	8	6	9	82	177	148	0	1	1
Total	164	272	282	369	263	218	2,246	1,090	1,153	23	33	66
31 weeks	8,535	11,399	13,737	165,338	151,020	141,283	225,923	347,041	347,041	1,079	1,321	4,027

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 3, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Aug. 3, 1940	Aug. 5, 1939		Aug. 3, 1940	Aug. 5, 1939		Aug. 3, 1940	Aug. 5, 1939		Aug. 3, 1940	Aug. 5, 1939	
NEW ENG.												
Maine	1	0	2	2	30	10	0	0	0	7	2	2
New Hampshire	0	0	0	0	0	1	0	0	0	0	0	0
Vermont	0	0	0	1	1	2	0	0	0	1	2	0
Massachusetts	1	2	2	26	28	35	0	0	0	3	1	2
Rhode Island	0	0	1	0	2	2	0	0	0	0	0	0
Connecticut	0	0	1	6	7	8	0	0	0	6	6	2
MID. ATL.												
New York	2	13	13	73	63	71	0	0	0	11	13	18
New Jersey	0	3	3	27	20	19	0	0	0	5	7	7
Pennsylvania	0	3	2	48	59	75	0	0	0	14	21	21
E. NO. CEN.												
Ohio	13	3	3	72	50	54	0	1	1	8	21	28
Indiana [2]	15	1	1	8	27	19	0	0	0	0	7	7
Illinois	7	4	10	59	40	91	8	7	2	20	27	19
Michigan [3]	8	46	10	57	52	60	1	4	0	4	1	5
Wisconsin	0	0	0	28	38	51	5	0	2	0	3	3
W. NO. CEN.												
Minnesota	2	4	4	11	29	28	1	1	1	1	3	3
Iowa	9	3	2	21	6	18	4	4	3	5	5	4
Missouri [2]	9	0	2	5	5	16	1	0	0	10	28	20
North Dakota	0	0	0	8	3	4	0	0	0	0	0	0
South Dakota	3	0	1	4	7	5	3	2	4	0	0	1
Nebraska	1	6	3	3	4	4	0	2	2	4	0	0
Kansas [4]	23	4	2	15	23	23	0	1	1	7	5	8
SO. ATL.												
Delaware [3]	0	0	0	1	0	0	0	0	0	0	4	2
Maryland [2] [3]	0	1	2	8	9	9	0	0	0	4	9	13
Dist. of Col. [2]	0	0	0	1	5	1	0	0	0	0	0	1
Virginia [2]	1	3	3	18	15	9	0	0	0	10	23	23
West Virginia [3]	13	0	0	13	14	14	0	0	0	9	14	14
North Carolina [2] [4]	1	2	2	19	17	17	0	0	0	10	13	23
South Carolina [4]	0	17	1	2	1	2	0	0	0	19	14	14
Georgia [4]	0	5	5	8	11	8	0	1	0	29	28	36
Florida [4]	1	1	0	2	10	3	0	0	0	4	3	4
E. SO. CEN.												
Kentucky	6	2	3	17	24	16	0	0	0	8	39	43
Tennessee [4]	1	3	3	8	9	11	4	0	0	12	11	40
Alabama [4]	1	1	1	13	14	9	0	0	0	11	19	19
Mississippi [3] [4]	0	1	4	6	10	5	0	0	0	13	13	16
W. SO. CEN.												
Arkansas	1	4	2	3	8	4	0	1	0	31	38	37
Louisiana [3]	11	0	0	5	8	5	0	0	0	16	15	23
Oklahoma	6	0	0	9	8	7	5	0	0	24	19	19
Texas [4]	7	14	4	8	14	21	0	0	0	37	57	70
MOUNTAIN												
Montana [2]	8	0	1	2	4	4	0	0	2	0	1	2
Idaho	4	0	0	3	1	2	0	0	2	0	1	1
Wyoming [2]	0	0	0	1	0	5	0	1	1	0	3	1
Colorado [2] [5]	0	1	1	3	17	17	1	0	0	0	2	2
New Mexico	1	1	0	3	4	4	0	2	0	5	2	6
Arizona	0	8	0	3	0	1	0	0	0	0	2	2
Utah [3]	1	0	0	2	7	7	0	0	0	2	1	1
PACIFIC												
Washington	15	1	1	24	4	10	0	0	5	4	2	2
Oregon [2]	8	1	1	6	7	7	1	0	2	2	2	2
California [4]	20	57	19	43	36	50	0	7	7	23	10	13
Total	195	210	210	705	751	927	34	34	52	.379	497	582
31 weeks	1,395	1,544	1,544	117,703	115,033	163,175	1,927	8,610	7,847	4,208	6,096	6,813

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 3, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough	
	Week ended	
	Aug. 3, 1940	Aug. 5, 1939
NEW ENG.		
Maine	84	37
New Hampshire	0	0
Vermont	35	0
Massachusetts	108	115
Rhode Island	4	11
Connecticut	46	58
MID. ATL.		
New York	311	480
New Jersey	76	261
Pennsylvania	437	523
E. NO. CEN.		
Ohio	467	166
Indiana [2]	17	77
Illinois	181	328
Michigan [3]	272	227
Wisconsin	99	207
W. NO. CEN.		
Minnesota	30	38
Iowa	36	31
Missouri [2]	36	25
North Dakota	3	9
South Dakota	6	1
Nebraska	2	9
Kansas [4]	53	19
SO. ATL.		
Delaware [2]	6	7
Maryland [2 3]	141	62
Dist. of Col. [2]	6	29
Virginia [2]	56	137
West Virginia [3]	27	35
North Carolina [2 4]	111	100

Division and State	Whooping cough	
	Week ended	
	Aug. 3, 1940	Aug. 5, 1939
SO. ATL.—continued		
South Carolina [4]	35	19
Georgia [4]	13	53
Florida [4]	2	16
E. SO. CEN.		
Kentucky	71	39
Tennessee [4]	71	59
Alabama [4]	10	29
Mississippi [3 4]		
W. SO. CEN.		
Arkansas	11	7
Louisiana [4]	7	102
Oklahoma	25	6
Texas [4]	209	79
MOUNTAIN		
Montana [2]	1	9
Idaho	11	4
Wyoming [2]	5	6
Colorado [2 5]	30	22
New Mexico	34	15
Arizona	17	6
Utah [3]	76	53
PACIFIC		
Washington	59	14
Oregon [2]	19	14
California [4]	317	149
Total	3,673	3,698
31 weeks	100,575	120,862

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Aug. 3, 1940, 20 cases as follows: Indiana, 2; Missouri, 1; Delaware, 1; Maryland, 4; District of Columbia, 1; Virginia, 2; North Carolina, 3; Montana, 2; Wyoming, 2; Colorado, 1; Oregon, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Aug. 3, 1940, 46 cases as follows: Kansas, 1; North Carolina, 1; South Carolina, 1; Georgia, 9; Florida, 9; Tennessee, 1; Alabama, 12; Mississippi, 1; Louisiana, 1; Texas, 9; California, 1.
[5] Colorado tick fever, week ended Aug. 3, 1940, Colorado, 2 cases.

PLAGUE INFECTION IN RODENT AND FLEAS IN CALIFORNIA AND WYOMING

IN A RODENT AND IN FLEAS FROM RODENTS IN SAN BERNARDINO COUNTY, CALIF.

Under dates of July 24 and 26, 1940, respectively, the Director of Public Health of California reported plague infection proved in one ground squirrel (*C. fisheri*) secured from Big Green Valley, San Bernardino County, Calif., and in a pool of 29 fleas from 17 ground squirrels (*C. fisheri*) from the same location.

IN FLEAS FROM RODENTS IN SUBLETTE COUNTY, WYO.

Under date of July 24, 1940, the Assistant Surgeon in charge of the Public Health Service Plague Suppressive Measures Laboratory, San Francisco, Calif., reported plague infection proved in a pool of 65 fleas from 14 ground squirrels (*C. armatus*) shot July 5, 1940, in territory from a Civilian Conservation Corps camp site to the GP Ranch at Green Lakes in Sublette County, Wyo.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 20, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	94	25	12	958	295	361	6	357	59	1,374	--------
Current week [1]	37	22	9	1,444	241	322	2	320	35	1,110	--------
Maine:											
Portland	0	------	0	0	1	1	0	0	0	4	20
New Hampshire:											
Concord	0	------	0	0	0	1	0	0	0	0	12
Manchester	0	------	0	0	0	0	0	0	0	0	13
Nashua	0	------	0	0	0	0	0	0	0	2	7
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	3	0	0	0	0	0	0	9
Rutland	0	------	0	0	0	0	0	0	0	0	12
Massachusetts:											
Boston	1	------	0	80	9	5	0	8	1	56	188
Fall River	0	------	0	27	0	0	0	2	0	3	23
Springfield	0	------	0	23	2	1	0	0	0	8	31
Worcester	0	------	0	128	2	2	0	2	0	5	89
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	12
Providence	0	------	0	38	2	1	0	1	0	5	52
Connecticut:											
Bridgeport	0	------	0	3	0	0	0	0	1	0	29
Hartford	0	------	0	0	0	0	0	0	0	3	32
New Haven	0	------	0	0	2	4	0	0	1	11	51
New York:											
Buffalo	0	------	0	1	3	7	0	3	0	18	119
New York	3	------	1	270	32	53	0	65	7	87	1,249
Rochester	0	------	0	2	1	0	0	0	0	6	68
Syracuse	0	------	0	0	2	5	0	1	0	4	36
New Jersey:											
Camden	0	------	0	1	2	1	0	0	0	0	25
Newark	0	------	0	87	0	12	0	3	0	20	78
Trenton	0	------	0	0	3	2	0	1	0	0	38
Pennsylvania:											
Philadelphia	0	1	0	123	7	28	0	18	2	29	412
Pittsburgh	1	1	1	2	7	9	0	6	0	17	156
Reading	0	------	0	0	0	0	0	1	0	24	23
Scranton	0	------	--------	0	--------	0	0	--------	0	1	--------
Ohio:											
Cincinnati	0	------	0	1	1	5	0	2	0	21	99
Cleveland	1	2	0	5	4	13	0	6	1	85	188
Columbus	1	------	0	1	1	4	0	4	0	17	76
Toledo	0	------	0	1	1	4	0	3	0	7	57
Indiana:											
Anderson	0	------	0	0	0	4	0	0	1	0	11
Fort Wayne	0	------	0	8	2	0	0	1	0	1	22
Indianapolis	1	------	0	1	5	5	0	8	0	11	88
Muncie	0	------	0	0	0	0	0	0	0	0	17
South Bend	0	------	0	0	0	0	0	0	0	0	16
Terre Haute	0	------	0	1	0	0	0	0	0	0	22

[1] Figures for Barre estimated; report not received.

City reports for week ended July 20, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Illinois:											
Alton	0		0	0	0	0	0	0	1	4	8
Chicago	9	2	0	100	16	61	0	50	0	62	634
Elgin	0		0	0	1	0	0	0	0	2	8
Moline	0		0	0	0	0	0	0	0	0	15
Springfield	0	1	0	0	2	0	0	0	0	0	21
Michigan:											
Detroit	1		0	216	13	18	0	11	0	115	242
Flint	0		0	0	0	2	0	1	0	0	33
Grand Rapids	0		0	7	0	8	0	0	0	25	22
Wisconsin:											
Kenosha	0		0	7	0	1	0	0	0	1	2
Madison	0		0	14	1	0	0	0	0	5	27
Milwaukee	0		0	164	4	5	0	1	0	5	86
Racine	0		0	3	0	2	0	0	0	0	12
Superior	0		0	11	0	0	0	1	0	0	12
Minnesota:											
Duluth	0		0	2	0	1	2	0	0	1	24
Minneapolis	0		0	1	1	5	0	1	0	5	84
St. Paul	0		0	2	1	2	0	1	0	16	46
Iowa:											
Cedar Rapids	0			0		4	0		0	0	
Davenport	0			0		0	0		0	0	
Des Moines	0		0	0	0	2	0	0	0	0	23
Sioux City	0			0		0	0		0	3	
Waterloo	1			2		0	0		0	3	
Missouri:											
Kansas City	0		0	0	2	5	0	3	0	2	83
St. Joseph	0		0	0	3	0	0	0	0	0	29
St. Louis	0		0	3	6	6	0	6	6	35	191
North Dakota:											
Fargo	0		0	0	0	1	0	0	0	0	7
Grand Forks	0			0		0	0		0	5	
Minot	0		0	0	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	0			0		0	1		0	2	
Sioux Falls	0		0	0	0	0	0	0	0	0	5
Nebraska:											
Lincoln	0			0		0	0		0	2	
Omaha	0		0	2	2	2	0	1	0	4	43
Kansas:											
Lawrence	0		0	0	0	0	0	0	0	0	1
Topeka	0		0	10	0	1	0	0	0	0	14
Wichita	0	1	1	0	1	1	0	0	0	10	22
Delaware:											
Wilmington	0		0	0	1	0	0	2	1	9	26
Maryland:											
Baltimore	0	1	0	2	7	6	0	16	0	148	203
Cumberland	0		0	0	1	0	0	0	0	0	10
Frederick	0		0	0	0	0	0	0	0	0	5
Dist. of Col.:											
Washington	2		0	1	6	4	0	6	0	5	129
Virginia:											
Lynchburg	0		0	1	1	0	0	1	0	2	10
Norfolk	0		0	4	1	3	0	0	0	4	23
Richmond	1		0	2	1	2	0	1	0	1	50
Roanoke	0		0	10	0	0	0	0	0	4	11
West Virginia:											
Charleston	0		0	0	4	0	0	0	0	2	12
Huntington	0			0		0	0		0	0	
Wheeling	0		0	1	0	0	0	0	1	5	21
North Carolina:											
Gastonia	0			0		0	0		0	0	
Raleigh	0		0	0	0	1	0	0	0	2	17
Wilmington	0		0	0	1	0	0	0	0	0	14
Winston-Salem	0		0	0	0	0	0	0	0	3	11
South Carolina:											
Charleston	0	1	0	1	3	0	0	1	1	0	20
Florence	0		0	0	1	0	0	0	0	0	10
Greenville	0		0	0	0	0	0	0	0	0	6
Georgia:											
Atlanta	0		0	1	5	2	0	6	0	7	67
Brunswick	0		0	0	1	0	0	0	0	0	3
Savannah	0	9	0	0	1	1	0	0	0	1	25
Florida:											
Miami	0		0	0	1	0	0	2	1	0	28
Tampa	0		0	1	1	0	0	1	0	2	15

City reports for week ended July 20, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Kentucky:											
Ashland	0		0	0	0	1	0	0	0	0	9
Covington	0		0	0	2	0	0	1	0	2	7
Lexington	1		0	18	0	0	0	2	0	1	14
Louisville	0		1	1	3	7	0	6	1	38	63
Tennessee:											
Knoxville	0		0	0	0	1	0	0	0	0	22
Memphis	0		0	6	3	3	0	4	1	17	90
Nashville	0		1	1	2	1	0	1	0	7	47
Alabama:											
Birmingham	0	1	3	2	3	1	0	3	2	0	67
Mobile	0		0	31	0	0	0	0	0	0	21
Montgomery	0			0		0	0		0	0	
Arkansas:											
Fort Smith	0			0		0	0		0	1	
Little Rock	0		0	0	0	0	0	4	0	5	
Louisiana:											
Lake Charles	1		0	0	1	0	0	1	2	0	6
New Orleans	0		0	0	11	1	0	7	5	2	149
Shreveport	0		0	0	2	0	0	1	0	0	39
Oklahoma:											
Oklahoma City	0	2	0	0	5	2	0	0	0	0	55
Tulsa	0		0	3	1	0	0	0	1	8	30
Texas:											
Dallas	0		0	11	2	2	0	3	3	13	57
Fort Worth	0		0	5	1	0	0	0	0	13	35
Galveston	1		0	0	3	0	0	0	0	2	11
Houston	1		0	0	3	1	0	6	2	1	84
San Antonio	0		0	1	4	0	0	10	0	4	64
Montana:											
Billings	0		0	0	1	1	0	1	0	1	10
Great Falls	0		0	1	0	1	0	0	0	0	6
Helena	0		0	0	0	0	0	0	0	0	6
Missoula	0		0	0	1	0	0	0	0	0	6
Idaho:											
Boise	0		0	0	0	0	0	0	0	0	6
Colorado:											
Colorado Springs	0		0	2	0	2	0	3	0	0	11
Denver	9		0	3	2	2	0	4	0	2	73
Pueblo	0		0	2	2	0	0	0	0	1	9
New Mexico:											
Albuquerque	0		0	0	0	0	0	2	0	2	7
Utah:											
Salt Lake City	0		0	23	8	8	0	1	0	50	40
Washington:											
Seattle	0		1	8	2	2	0	5	0	10	68
Spokane	0		0	1	2	0	0	0	0	0	28
Tacoma	0		0	1	1	0	0	3	0	3	28
Oregon:											
Portland	0		0	6	1	1	0	1	0	5	56
Salem	0			0		0	0		0	0	
California:											
Los Angeles	5	2	1	4	10	7	0	20	0	66	342
Sacramento	0		0	1	1	0	0	3	0	2	28
San Francisco	0		0	3	11	1	0	1	0	22	169

City reports for week ended July 20, 1940—Continued

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases	State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Massachusetts:				Virginia:			
Worcester	0	0	1	Richmond	0	0	1
Rhode Island:				Kentucky:			
Pawtucket	1	1	0	Lexington	1	0	0
New York:				Alabama:			
Buffalo	1	1	2	Birmingham	1	0	0
New York	1	0	0	Oklahoma:			
Pennsylvania:				Oklahoma City	2	0	0
Philadelphia	0	0	1	Tulsa	0	0	1
Ohio:				Texas:			
Cleveland	1	0	0	Dallas	0	0	2
Indiana:				Utah:			
Indianapolis	1	0	0	Salt Lake City	0	0	2
Illinois:				Washington:			
Springfield	0	0	1	Tacoma	0	0	6
Wisconsin:				California:			
Racine	0	0	1	Los Angeles	0	0	5
Nebraska:				Sacramento	0	0	1
Omaha	0	0	2				
Kansas:							
Wichita	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: Newark, 1; Sacramento, 1.

Pellagra.—Cases: Boston, 1; Savannah, 1; San Francisco, 1.

Typhus fever.—Cases: New York, 1; Savannah, 3; Miami, 3; Tampa, 2; New Orleans, 1; Houston, 1; San Antonio, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 29, 1940.—During the week ended June 29, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1			1					2
Chickenpox		3		45	204	70	32	11	70	435
Diphtheria				3	4					7
Dysentery					1				1	2
Influenza		12			15			1	10	38
Lethargic encephalitis							1			1
Measles		2	2	61	187	56	140	131	83	662
Mumps				5	79	3	4		5	96
Pneumonia	2	1			17		1		6	27
Poliomyelitis					1					1
Scarlet fever		1		80	45	2	2	13	2	145
Trachoma									25	25
Tuberculosis		1	12	61	32	4		6		116
Typhoid and paratyphoid fever				21	1	1	1	1		25
Whooping cough		3	3	136	91	18	22	12	9	294

JAMAICA

Communicable diseases—4 weeks ended July 6, 1940.—During the 4 weeks ended July 6, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	1	14	Poliomyelitis		2
Dysentery	7	9	Tuberculosis	37	87
Leprosy		3	Typhoid fever	5	54

SWITZERLAND

Communicable diseases—May 1940.—During the month of May 1940, cases of certain communicable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	70	Paratyphoid fever	31
Chickenpox	83	Poliomyelitis	11
Diphtheria and croup	37	Scarlet fever	346
German measles	126	Tuberculosis	329
Influenza	11	Typhoid fever	8
Measles	1,140	Whooping cough	111
Mumps	51		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of July 26, 1940, pages 1367–1370. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Peru.—During the month of April 1940, plague was reported in Peru, by Departments, as follows: Cajamarca, 5 cases; Lambayeque, 1 case; Libertad, 1 case; Lima, 2 cases, 2 deaths.

United States.—A report of plague infection in San Bernardino County, Calif., and in Sublette County, Wyo., appears on pages 1466 and 1467 of this issue of PUBLIC HEALTH REPORTS.

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Public Health Reports

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IN THIS ISSUE

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1798

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

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EVALUATION OF A MOUSE TEST FOR THE STANDARDIZATION OF THE IMMUNIZING POWER OF ANTI-RABIES VACCINES [1]

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The ideal animal test for the standardization of any vaccine should be done under conditions either similar to or at least comparable to those under which the vaccine is used clinically in human beings. The technique of performing the test should be simple and there should be no procedure in which individual differences of the technician might cause variation in results. The time required to complete a test is of practical importance since the material being tested cannot be released for clinical use until successfully meeting the requirements. Therefore the duration of the test should be sufficiently short so as not to subtract materially from the life of the vaccine. Results should be unequivocal and subject to but one interpretation. On repetition of identical tests the results should be uniform. The test animals used should be easily available, inexpensive, and easily cared for in the laboratory. The material used in testing the immunity produced by the vaccine must be uniform in its effect and in its potency, or the test must be so arranged that any changes in these properties will be revealed in the results. These are the requirements of the ideal test.

Since rabies vaccine was first used it has been subjected to many types of experimental tests to determine its immunizing properties and, therefore, its efficacy in the Pasteur treatment of human beings. This subject has been reviewed recently by Webster (*1*), who emphasizes the general lack of positive results in the light of statistical analysis of the published protocols.

In general, the following types of tests have been used.

1. *Injection of rabies virus into central nervous system (subdural, intracerebral, intraocular) followed by a course of vaccine treatment* (*1*).—In this method results have been quite consistently negative, the same mortality usually occurring among the vaccinated and control animals. This is easily understandable, since the direct introduction

[1] From the Division of Biologics Control, National Institute of Health.

of virus into the central nervous system produces the disease so rapidly that there is not sufficient time for a subsequent course of vaccine to produce immunity.

2. *Injection of rabies virus peripherally (intramuscular, subcutaneous, dog bite) followed by a course of vaccine treatment* (*1*).—This, of course, is the ideal method from the standpoint of simulating clinical conditions. Webster (*1*) has reviewed 98 such experiments and finds only 6 which show a significant degree of immunity. Besides the low percentage of positive results, there are several other disadvantages. First, rabies street virus must be used and the mortality even of control animals receiving such virus peripherally is extremely variable. Further, street virus strains vary considerably in their infectivity and even one strain will not be uniform over a long period for repeated testing since the animal passage necessary for maintaining it also changes its characteristics. The danger of laboratory infection of technicians in vaccinating animals which may be developing street virus rabies must also be considered. And, finally, there is the possibility of contaminating the rabies vaccine by mixing the brains of animals used to carry the street virus with those used for fixed virus. This would be of particular significance in those laboratories producing the live virus types of vaccine.

3. *Injection of virus into central nervous system subsequent to a course of vaccine treatment* (*1*).—The chief objections to this method are, first, that it does not simulate the clinical use of rabies vaccine in human beings and, second, that virus injected directly into the central nervous system is too severe a test, often bringing down all control and vaccinated animals.

4. *Injection of virus peripherally subsequent to a course of vaccine treatment* (*1*).—This method is closer to clinical conditions, but here the objections to street virus are again valid since most of these tests have used some street virus strain in the test dose. Several authors, however, have used fixed virus, or at least passage virus, as the test dose material with good results (*2, 3, 4*). There apparently is difficulty, however, in determining the M. L. D. by this method, the end point in titering the test virus being less definite than when titered intracerebrally. Another disadvantage would seem to be the greater possibility for individual differences in technique in an intramuscular as compared to an intracerebral injection.

5. *Development of virus neutralizing antibodies in serum of vaccinated animals.*—The titer of neutralizing antibodies in the serum can be determined after an immunizing course of vaccine and this has been suggested as evidence of the immunizing power of the vaccine by some authors (*5*). However, it has been shown in experimental animals that there is no direct relationship between serum antibody titer and the degree of actual immunity (*6*).

6. *Statistical review of human mortality rates in vaccinated individuals* (*7*).—Human mortality rates in vaccinated individuals obviously furnish an inaccurate estimate of the immunizing power of any vaccine since the degree of infection and often the definite diagnosis of rabies in the biting animal is not known. Also, the mortality rate in the persons bitten but not vaccinated is usually not available as a control. However, such a method is of no interest in the development of a standardizing test for rabies vaccines before their release for human use, which is the problem being considered here.

The monkey, dog, guinea pig, rabbit, rat, and mouse have all been used as exper mental animals in tests of the immunizing power of anti-rabies vaccine. The expense and difficulty of obtaining large numbers of uniform animals rules out the routine use of the monkey and the dog. If the experiments are conducted in such a way as to attempt to determine the number of M. L. D.'s resisted by the vaccinated animals, then the number required would probably eliminate the guinea pig, rabbit, and perhaps the rat for the same reasons. For practical purposes the mouse would seem to be the best animal and it is known to be quite susceptible to rabies infection. For this reason the experiments here reported have been limited almost exclusively to the investigation of an immunity test in mice.

The mouse technique has been developed chiefly by Webster (*4*) at the Rockefeller Institute. In general, it consists of a series of intraperitoneal injections of vaccine followed by the test dose of virus injected either into the central nervous system or peripherally in serial dilutions.

INVESTIGATION OF LIMITATIONS OF MOUSE TEST

MOUSE FACTORS

(1) *Strain of mice.*—For uniform results in a biological test the use of animals of a pure strain is desirable because of possible variations in reactions of animals of different strains. The Swiss white mouse strain is now well established in this country as a pure strain well suited for biological work. It is easily available from most animal breeders and, as far as can be determined, the line has been kept pure. The mice used routinely in this laboratory are of this strain.

Groups of 25 female Swiss mice, 1 month old, from our own breeding department and purchased from three outside dealers were immunized with a vaccine (5 percent emulsion, 0.5 percent phenol) known to be highly immunizing. All mice were given 6 intraperitoneal doses of 0.25 cc. of a 1/10 dilution, each dose being given every second day. Fourteen days after the first dose of vaccine the test dose of fixed virus (heterologous strain) was injected intracerebrally in serial tenfold dilutions. The M. L. D. for each group was obtained by

setting aside 15 control mice at the start of the experiment and injecting them with the test dose dilutions.

Table 1 shows that there was rather close agreement as to the amount of protection (6,000 and 4,722 M. L. D.) between mice of substrains A and B, but that mice of substrains C and D showed 20,000 and 45,000 M. L. D. immunity, respectively. In seeking for an explanation of these discrepancies we found that, although supplied to us by outside dealers as 1-month-old mice, the mice from breeders C and D were apparently older than this, as shown by their average weights:

Substrain A	11 gm. average weight, 6,000 M. L. D. protection
Substrain B	11 gm. average weight, 4,722 M. L. D. protection
Substrain C	12 gm. average weight, 20,000 M. L. D. protection
Substrain D	15 gm. average weight, 45,000 M. L. D. protection

TABLE 1.—*Ability of substrains of Swiss mice to be immunized by same rabies vaccine*

Substrain of Swiss mice	Test dose dilutions of fixed virus intracerebrally (number rabies deaths/number tested)							Number of M. L. D. protection (dilution= 1 M. L. D.)
	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. Substrain A mice, 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 6 doses. Test dose on 14th day:								
a. Vaccine No. 1	2/4	2/4	0/4	0/4	2/4	------	------	[1] 6,000
b. Controls	------	------	------	------	3/4	1/3	0/3	(1/600,000)
II. Substrain B mice:								
a. Vaccine No. 1	4/5	1/6	2/5	2/5	2/5	------	------	4,722
b. Controls	------	------	------	------	4/4	3/5	1/4	(1/2,125,000)
III. Substrain C mice:								
a. Vaccine No. 1	3/5	2/5	1/5	1/4	0/4	------	------	20,000
b. Controls	------	------	------	------	3/5	4/5	0/5	(1/1,400,000)
IV. Substrain D mice:								
a. Vaccine No. 1	3/5	0/6	0/6	0/5	0/5	------	------	45,000
b. Controls	------	------	------	------	5/5	2/5	0/4	(1/900,000)

[1] All 50 percent end points (see reference *10*).

As will be shown in the next series of experiments reported in this paper, the degree of immunity produced by a vaccine increases with the age of the mice up to a certain point. In this experiment there was close agreement between the two groups of the same average weight and the degree of immunity increased with the weight of the mice in the other two groups.

(2) *Age of mice.*—Casals and Webster (*8*) have shown that the ability of mice to be immunized against rabies is proportionate to their age. At least they demonstrated a much greater immunity in 60-day-old as compared with 21-day-old vaccinated mice when tested with intramuscular post-vaccination virus.

Groups of female Swiss mice 1 month old (average weight 11 gm.), 2 months old (average weight 22 gm.), and 6 months old (average weight 24 gm.) were immunized with vaccine No. 1 of known high and vaccine No. 2 of known low immunizing power. They received 0.25 cc. of 1/10 dilution intraperitoneally every second day for 6 doses

and were injected intracerebrally with fixed virus dilutions on the fourteenth day. Controls at each age level were injected simultaneously with the test virus. Table 2 reveals that when immunized with vaccine No. 1, 1-month-old mice resisted 6,000 M. L. D., 2-month-old mice 16,666 M. L. D., and 6-month-old mice probably 200 M. L. D., although this is not so definite since the control dilutions were not carried out far enough to establish a definite end point. All age groups failed to develop demonstrable immunity with vaccine No. 2.

TABLE 2.—*Immunity produced by same vaccines in Swiss mice of different ages*

Age of mice	Test dose dilutions of fixed virus intracerebrally (number rabies deaths/number tested)							Number of M. L. D. protection (dilution = 1 M. L. D.)
	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. One-month-old mice, 0.25 cc 1/10 dil. intraperitoneally every 2 days for 6 doses. Test dose on 14th day:								
a. Vaccine No. 1	2/4	2/4	0/4	0/4	2/4	------	------	6,000
b. Vaccine No. 2	5/5	4/5	5/5	3/4	4/5	------	------	Less than 10
c. Controls	------	------	------	------	3/4	1/3	0/3	(1/600,000)
II. Two-month-old mice:								
a. Vaccine No. 1	2/3	0/4	1/4	1/3	------	------	------	16,666
b. Vaccine No. 2	2/2	4/4	3/4	2/2	------	------	------	Less than 100
c. Controls	------	------	------	4/4	4/4	3/4	------	(1/1,000,000)
III. Six-month-old mice:								
a. Vaccine No. 1	3/5	3/5	2/5	2/4	1/4	------	------	200+(?)
b. Vaccine No. 2	3/3	3/4	4/4	4/4	3/4	------	------	0
c. Controls	------	------	3/3	3/3	4/4	------	------	(1/100,000)(?)

(3) *Sex of mice.*—Two similar experiments were performed about 1 month apart. In both a group of 1-month-old male and an equal group of 1-month-old female Swiss mice were immunized. They received 0.25 cc. of 1/10 dilution of vaccine No. 1 intraperitoneally every second day for 6 doses. In the first experiment the test dose was given on the twenty-first day, whereas in the second experiment it was given on the fourteenth day.

TABLE 3.—*Influence of sex of mice on immunity produced*

Sex of mice	Test dose dilutions of fixed virus intracerebrally (number rabies deaths/number tested)							Number of M. L. D. protection (dilution=1 M. L. D.)
	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. 0.25 cc. 1/10 dil. vaccine No. 1 intraperitoneally every 2 days for 6 doses. Test dose on 21st day:								
a. Female mice—								
1. Vaccinated	------	2/3	0/3	2/4	1/3	------	------	1,250
2. Controls	------	------	------	------	4/4	2/4	------	(1/1,000,000)
b. Male mice—								
1. Vaccinated	------	4/4	4/4	0/4	0/4	------	------	100
2. Controls	------	------	------	------	4/4	0/4	------	(1/550,000)
II. 0.25 cc. 1/10 dil. vaccine No. 1 intraperitoneally every 2 days for 6 doses. Test dose on 14th day:								
a. Female mice—								
1. Vaccinated	2/4	2/4	0/4	0/4	2/4	------	------	6,000
2. Controls	------	------	------	------	3/4	1/3	0/3	(1/600,000)
b. Male mice—								
1. Vaccinated	3/4	1/4	3/4	2/4	0/4	------	------	1,000
2. Controls	------	------	------	------	2/4	3/4	0/3	(1/1,000,000)

In the first experiment, as shown in table 3, the females resisted 1,250 M. L. D. as compared with but 100 M. L. D. for the males. In experiment 2 the females gave 6,000 M. L. D. protection and the males 1,000 M. L. D.

(4) *Number of mice on test.*—An important question in the test is the number of mice to be used in order to secure uniform results.

Two groups of 1-month-old Swiss mice were immunized by 10 doses of 0.25 cc. of 1/10 dilution, given intraperitoneally every second day, using vaccine No. 1 and vaccine No. 2. The test dose was given on the twenty-first day from the start of the vaccine in serial tenfold dilutions. Each group was subdivided so that the test was done in duplicate, one subgroup consisting of 3 mice receiving each dilution of the test dose and the other of 4 mice. In the two subgroups a total of 7 mice received each dilution.

Table 4 shows that for vaccine No. 1 the 50 percent end point was the same (at least 10,000 M. L. D. protection) whether 3, 4, or 7 mice were injected. However, with vaccine No. 2, when 3 mice were included there was protection against less than 10 M. L. D., against 550 M. L. D. when 4 mice were used, and against 314 M. L. D. when 7 mice were injected.

TABLE 4.—*Influence of number of mice tested on results*

Number of mice tested with each dilution of test virus	Test dose dilutions of fixed virus intracerebrally (Number rabies deaths/number tested)						Number of M. L. D. protection (dilution=1 M. L. D.)
	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. Vaccine No. 1, 0.25 cc. of 1/10 dil. intraperitoneally every 2 days for 10 doses. Test dose on 21st day:							
a. 3 mice to a group	0/3	1/3	0/3	1/3	------	------	10,000+
b. 4 mice to a group	0/4	1/4	1/4	0/4	------	------	10,000+
c. 7 mice to a group	0/7	2/7	1/7	1/7	------	------	10,000+
II. Vaccine No. 2, 0.25 cc. of 1/10 dil. intraperitonally every 2 days for 10 doses. Test dose on 21st day:							
a. 3 mice to a group	3/3	2/3	2/3	3/3	------	------	Less than 10.
b. 4 mice to a group	3/4	4/4	0/4	0/4	------	------	550
c. 7 mice to a group	6/7	6/7	2/7	3/7	------	------	314
III. Controls	------	------	4/4	4/4	3/4	0/4	(1/2,200,000)

VACCINE FACTORS

(1) *Percentage emulsion used in vaccine.*—Because of the amount of chemical (phenol, chloroform, formalin) in the undiluted vaccine, its use in that form in mice gives symptoms of and occasionally deaths from chemical intoxication. Therefore the vaccine must be diluted. Webster (*4*) dilutes all vaccines 1 to 10 regardless of the percentage of the original emulsion. For the usual 5 percent emulsion vaccine this represents, in the dose usually used for the mouse (Webster ⅛ of human dose), approximately 18 times the relative dose by weight given to a 100-pound person. However, the mice receive but 6 doses as

compared with 21 doses in the human being. Mice thus receive but 6 times as much brain substance. Therefore, if the vaccine were diluted 1/60 or 1/50 it would more closely approximate the human dose by weight. Groups of 20 female Swiss mice 1 month old received 0.25 cc. of 1/10, 1/25, and 1/50 dilutions of the 5 percent phenolized vaccine No. 1, intraperitoneally, every second day for 6 doses. Twenty-one days from the start of the vaccination each group was subdivided into groups of 4 mice each and given, intracerebrally, serial tenfold dilutions of the test strain of fixed virus. They were observed for 21 days before being discharged. Table 5 shows the results. The 1/10 dilution of vaccine protected against 1,250 M. L. D.; the 1/25 and 1/50 dilutions gave immunity against 45 and 55 M.L.D., respectively.

TABLE 5.—*Influence of amount of vaccine injected on immunity produced*

Dilution of vaccine No. 1	Test dose dilutions of fixed virus intracerebrally (number rabies deaths/number tested)						Number of M. L. D. protection (dilution=1 M. L. D.)
	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
0.25 cc. vaccine intraperitoneally every 2 days for 6 doses. Test dose on 21st day:							
1/10 dilution	2/3	0/3	2/4	1/3	-----	-----	1250
1/25 dilution	4/4	4/4	3/4	0/4	0/3	-----	45
1/50 dilution	4/4	4/4	2/4	1/4	0/3	-----	55
Controls	-----	-----	-----	4/4	2/4	0/4	(1/1,000,000)

(2) *Site of injection.*—Rabies vaccine is given subcutaneously to human beings, but within the limits of the doses practicable for the mouse even vaccines of known high antigenicity fail to produce demonstrable immunity when given subcutaneously to mice. Immunity is developed regularly when the same dose is given intraperitoneally. A further advantage of the intraperitoneal injection for routine testing is the relative resistance to infection with live virus given by that route when live virus vaccines are being tested.

(3) *Volume of vaccine per dose.*—Mice of 1 month of age can be given up to 0.75 cc. intraperitoneally, but 0.25 cc. is readily tolerated and has been used in all these experiments.

(4) *Number and interval of vaccine doses.*—Groups of 20 female Swiss mice 1 month old were immunized according to the following schedules, using both vaccine No. 1 and vaccine No. 2.

A.......... 0.25 cc. of 1/10 dil., intraperitoneally, 1 dose.
B.......... 0.25 cc. of 1/10 dil., intraperitoneally, every second day for 5 doses.
C.......... 0.25 cc. of 1/10 dil., intraperitoneally, every day for 10 doses.

On the tenth day following the first dose of vaccine the mice were divided into groups of 4 and given the test dose strain of fixed virus intracerebrally.

TABLE 6.—*Influence of the number and interval of vaccine doses on degree of immunity*

Dosage schedule of vaccines	Test dose dilutions of fixed virus intracerebrally (number rabies deaths/number tested)						Number of M. L. D. protection (dilution=1 M. L. D.)
	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. Vaccine No. 1:							
a. 0.25 cc. 1/10 dil. intraperitoneally, 1 dose	4/4	4/4	4/4	4/4			Less than 10.
b. 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 5 doses	3/4	1/4	2/4	2/3			800
c. 0.25 cc. 1/10 dil. intraperitoneally every day for 10 doses.	4/4	1/4	1/4	1/3			1,600
II. Vaccine No. 2							
a. 0 25 cc. 1/10 dil. intraperitoneally, 1 dose	4/4	4/4	4/4	4/4			Less than 10.
b. 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 5 doses.	3/3	3/3	3/3	3/3			Less than 10
c. 0.25 1/10 dil. intraperitoneally every day for 10 doses.	3/4	4/4	4/4	3/3			Less than 10.
III. Controls			4/4	4/4	2/3	0/4	(1/1,600,000)

Test dose on tenth day.

The results, as shown in table 6, indicate that with both the vaccines of high and low antigenicity, no immunity could be demonstrated in 10 days in the groups receiving a single immunizing dose. When 5 doses every second day were given there was no immunity with vaccine No. 2 and 800 M. L. D. protection with vaccine No. 1. Ten daily immunizing doses with vaccine No. 1 protected against 1,600 M. L. D. but with vaccine No. 2 gave no protection.

TEST DOSE FACTORS

(1) *Street virus or fixed virus.*—The disadvantages of using street virus in routine testing over a period of time have been mentioned above. This experiment was designed to compare the degree of protection in mice immunized with vaccine No. 1 and vaccine No. 2 when tested by both street and fixed virus intracerebrally.

Groups of 16 female Swiss mice 1 month old received 0.25 cc. of 1/10 vaccine dilution intraperitoneally every second day for 10 doses. The test doses of fixed virus strain and of first guinea pig passage street virus (original dog brain virus) were given intracerebrally 21 days from the start of vaccine injection.

Table 7 shows that vaccine No. 1 protected against 10,000 M. L. D. of fixed virus and against at least 1,000 M. L. D. of street virus. Vaccine No. 2 protected against 461 M. L. D. of fixed virus and but 10 M. L. D. of street virus. The discrepancies here are understandable in view of the irregular results with the street virus even in the controls.

(2) *Number of M. L. D. in test dose dilutions.*—How closely can we determine the number of M. L. D. protected against in this type of test? In other words, by how much shall the serial dilutions of the test dose differ? A fairly large series of tests of this type have been done giving 1, 10, 25, 50, 100, and 200 M. L. D. to the groups of

vaccinated mice. With the levels of the test virus dilutions this close to one another there are frequently discrepancies and overlapping of groups so that a definite end point is difficult to determine. On the other hand, if tenfold serial dilutions are made this overlapping is, to a great extent, eliminated. Since the test dose virus titration is being done in the controls at the same time the test is being run in the vaccinated animals it is impossible to know exactly beforehand what the titer will be. However, if test virus passages are done in mice in the same manner the week before each test and the mice are killed at the same stage of fixed virus rabies, the brains kept in the cold (0° C.), and then emulsified the day the test dose is given, the titer will usually be the same each time.

TABLE 7.—*Comparison of immunity to fixed virus and street virus intracerebrally*

Groups tested	Test dose dilutions of fixed and street virus intracerebrally (number rabies deaths/number tested)						Number of M L D protection (dilution=1 M L D)
	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. Vaccine No. 1, 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 10 doses. Test dose on 21st day:							
a. Fixed virus test dose	0/3	1/4	1/4	0/4	------	------	10,000+
b. Street virus test dose	0/3	0/3	0/4	0/4	------	------	1,000+
II. Vaccine No. 2, 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 10 doses. Test dose on 21st day:							
a. Fixed virus test dose	3/4	4/4	0/4	0/3	------	------	461
b. Street virus test dose	3/3	2/4	0/4	0/4	------	------	10
III. Controls.							
a. Fixed virus	------	------	------	4/4	3/4	0/4	(1/2,800,000)
b. Street virus	------	------	1/4	2/4	0/4	------	(1/10,000)

(3) *Homologous vs. heterologous strain of fixed virus.*—In order to determine whether cross immunity exists between different strains of fixed rabies virus and, therefore, whether homologous virus may be used as the test dose, the following experiment was made.

Groups of 20 female Swiss mice 1 month old were vaccinated intraperitoneally with 6 doses of 0.25 cc. of 1/10 dilution of vaccine No. 1, each dose given every second day. Twenty-one days from the first dose of vaccine the following fixed virus strains were given intracerebrally as the test dose to the 3 groups:

Virus A.—Homologous strain, identical with that used to prepare vaccine No. 1, originally the Pasteur strain.

Virus B.—Heterologous strain, isolated from a rabid dog in 1935 and carried through approximately 80 intracerebral passages in mice.

Virus C.—Heterologous strain, isolated from a rabid skunk and carried through 170 intracerebral passages in mice.

A control group was inoculated with each fixed virus strain to determine its titer.

Table 8 summarizes the results. Homologous virus A demonstrated protection against 8,000 M. L. D., heterologous virus B against 1,250 M. L. D., and heterologous virus C against 10,000 M. L. D.

TABLE 8.—*Comparison of immunity tested by homologous and heterologous fixed virus*

Strain of test dose fixed virus	Test dose dilutions of fixed virus intracerebrally (number rabies deaths/number tested)							Number of M. L. D. protection (dilution=1 M. L. D.)
	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. Homologous virus A, 0.25 cc. 1/10 dil. vaccine No. 1 intraperitoneally every 2 days for 6 doses. Test dose on 21st day:								
a. Vaccinated	3/3	1/4	1/4	1/4	0/4	------	------	8,000
b. Controls	------	------	------	4/4	4/4	1/3	------	(1/800,000)
II. Heterologous virus B:								
a. Vaccinated	------	2/3	0/3	2/4	1/3	------	------	1,250
b. Controls	------	------	------	------	4/4	2/4	------	(1/1,000,000)
III. Heterologous virus C:								
a. Vaccinated	0/3	2/4	1/3	2/4	------	------	------	10,000
b. Controls	------	------	------	4/4	2/4	4/4	------	(1/1,000,000)

(4) *Diluent used for test dose.*—It has been shown by Milam (*9*) that rabies virus in high dilutions is readily killed in a short time at room temperature if the diluent is normal saline. Ten percent horse serum in distilled water kept the virus viable in high dilutions for the longest time and this has been used throughout these experiments. This is important where a large number of mice are being given the test dose, for if the procedure takes several hours the virus given to the final groups of mice may have a lower titer than that given at the start of the test.

(5) *Route of administration of virus.*—The choice here is between an intracerebral or a peripheral injection of test virus. Webster (*4*) has favorably compared results in mice by the two methods. However, the difficulty of determining a definite end point of the titer even in controls and the relatively small range of dilutions that are infective are disadvantages of the intramuscular test. Injected into the gastrocnemius muscle, as Webster recommends, the dose in mice is 0.01 cc. The difficulty of delivering exactly 0.01 cc. from an ordinary 0.25 cc. syringe, together with the fact that serial dilutions of the test virus are of but twofold differences (2, 4, 8, 16 M. L. D.) would seem to make the overlapping of groups quite likely and therefore make a definite end point of the number of M. L. D. protected against more difficult to determine.

To be sure, the intracerebral virus is a very severe test of immunity but it is reasonable to assume that a vaccine giving protection against the more severe test of virus given intracerebrally would likewise give protection against the less severe test of intramuscular virus.

(6) *Sources of error in technique.*—The possibility of error sufficient to affect the results of the test lies chiefly in the way in which the intracerebral injection is made. In the first place, the mouse must be anesthetized deeply enough so that the injection can be completed before the mouse begins to struggle. Second, the end of the needle must be in the substance of the brain. It is possible to insert the

needle too far and then the virus may be injected into the nasopharynx instead of intracerebrally. This can, in part, be prevented by using a short needle (⅛ to 3/16 in.). The site of the injection is a little to one side of the midline, half the distance from eye to ear. The chief source of error in our experience has been due to leakage of the injected material through the opening in the skull left when the needle is withdrawn. This leakage by measurement has often amounted to 0.02 cc. of the 0.03 cc. originally injected. To overcome this a fine gauge, sharply bevelled needle should be used (27-gauge preferably). The injection should be slow enough to allow some diffusion of the material away from the needle tip. And, most important of all, the finger or thumb of the left hand holding the mouse's head during the injection should be placed over the site of the injection as soon as the needle is removed and light pressure applied for a few seconds.

(7) *Interval from start of immunization to test dose.*—Since the amount of time required for any test should be as short as possible in order that the product being tested may be released for use, it is important to determine the minimum number of days necessary for the immunized mice to develop demonstrable immunity.

Webster (*4*) has reported that mice given 1 intraperitoneal dose of an antigenic vaccine will show demonstrable immunity within 7 days. However, most workers have waited 21 or 30 days after the first dose of vaccine before giving the test dose.

Four groups of 16 Swiss mice 1 month old were immunized. Two groups received vaccine No. 1 and 2 vaccine No. 2. One of the 2 groups used for each vaccine received 0.25 cc. of 1/10 dilution, intraperitoneally, every day for 10 doses and was given the test dose intracerebrally on the tenth day. The other group was given 0.25 cc. of 1/10 dilution of vaccine intraperitoneally every second day for 10 doses and the test dose was given intracerebrally on the twenty-first day.

TABLE 9.—*Influence of time of test dose*

Groups tested	Test dose dilution of fixed virus intracerebrally (number ratios deaths number tested)						Number of M. L. D. protection (dilution=1 M. L. D.)
	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. Vaccine No. 1:							
a. 0.25 cc. 1/10 dil. intraperitoneally every day for 10 doses. Test dose on 10th day	4/4	1/4	1/4	1/3	------	------	2600
b. 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 10 doses. Test dose on 21st day	0/3	1/4	1/4	0/4	------	------	10,000+
II. Vaccine No. 2:							
a. 0.25 cc. 1/10 dil. intraperitoneally every day for 10 doses. Test dose on 10th day	3/4	4/4	4/4	3/3	------	------	Less than 10.
b. 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 10 doses. Test dose on 21st day	3/4	4/4	0/4	0/3	------	-----	722
III. Controls:							
a. On 10th day	------	------	4/4	4/4	2/3	--	(1/1,000,000)
b. On 21st day	------	------	------	4/4	3/4	0/4	(1/2,600,000)

The results given in table 9 show that, with the highly immunizing vaccine, mice tested on the tenth day resisted 2,600 M. L. D. and those tested on the twenty-first day resisted at least 10,000 M. L. D. However, with mice immunized with the less immunogenic vaccine those tested at 10 days had no immunity, whereas those tested at 21 days resisted 722 M. L. D.

Using the same highly immunogenic vaccine No. 1, one month after the above experiment, a group of mice received 0.25 cc. of 1/10 dilution, intraperitoneally, every second day for 6 doses. They were tested on the fourteenth day (See Ia, table 2) and resisted 6,000 M. L. D.

(8) *Interval from test dose to discharge of mice.*—The time required for observation of the mice following the test dose adds greatly to the total time required for the mouse test. In a series of over 50 tests of immunity in mice, using fixed virus intracerebrally as the test dose and observing the mice for 30 days, it has been found that the average time of the last death is 15 days, with an occasional death up to 20 days. A death after 20 days of observation is exceedingly rare.

UNIFORMITY OF RESULTS

Any test of biological products should give the same results when done in duplicate.

Vaccine No. 1 was given in 10 doses every second day, 0.25 cc. of 1/10 dilution, intraperitoneally, to 2 groups of 1-month-old Swiss mice. The test dose was given intracerebrally on the twenty-first day. Table 10 shows that both groups resisted at least 21,000 M. L. D.

The same was done with vaccine No. 2, using 3 groups of mice. One of these groups showed resistance to 500 M. L. D., another resisted 21 M. L. D., and a third 55 M. L. D.

TABLE 10.—*Results of duplicate tests*

Groups tested	Test dose dilution of fixed virus intracerebrally (number rabies deaths/number tested)						Number of M. L. D. protection (dilution=1 M. L. D.)
	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	
I. Vaccine No. 1, 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 10 doses. Test dose on 21st day:							
Group I	0/3	1/3	0/3	1/3	------	------	21,000+
Group II	0/3	1/4	1/4	0/4	------	------	21,000+
II. Vaccine No. 2, 0.25 cc. 1/10 dil. intraperitoneally every 2 days for 10 doses. Test dose on 21st day:							
Group I	3/4	4/4	0/4	0/4	------	------	500
Group II	3/3	2/3	2/3	3/4	------	------	21
Group III	3/4	3/4	3/4	2/3	------	------	55
III. Controls	------	------	------	4/4	3/4	0/4	(1/2,100,000)

COMPARISON TO CLINICAL CONDITIONS

The closest approach to clinical conditions in experimental animals is the post-infection immunization method where street virus is given peripherally and then the vaccine is started.

A group of 36 guinea pigs weighing 250 to 300 grams was given 0.2 cc. of 1/10 centrifuged emulsion of original dog brain street virus in each masseter muscle. Thirty animals were started immediately on a series of 21 daily injections of 0.5 cc. of vaccine No. 1, which had been shown to produce a high degree of immunity in the mouse test. Three of the vaccinated and 1 control guinea pig died of infections other than rabies, 11 vaccinated guinea pigs died of rabies, while 16 survived, whereas 4 of the 5 controls developed rabies. The animals were observed for a period of 2 months and all deaths were checked by smears of Ammon's horn for Negri bodies to verify the diagnosis.

INTERPRETATION OF RESULTS

What should be considered the end point of protection in the mouse test? When results are clear-cut the end point may be taken as the greatest number of M. L. D. with which 50 percent of the mice survive. However, quite often the differentiation between groups representing the different numbers of M. L. D. is not so clear-cut. Then the method of Reed and Muench (*10*) for determining 50 percent end points should be employed for both control and vaccinated groups. By dividing that dilution representing the 50 percent end point of the controls into that of the vaccinated mice the number of M. L. D. protection is obtained.

Discussion

In view of the experimental results here reported, the recommended technique in the mouse test is as follows:

Thirty Swiss mice, all of one sex and preferably females, 1 month of age (11 to 13 grams) should be given 0.25 cc. of a 0.5 percent brain emulsion of the vaccine (1/10 dilution for 5 percent vaccine, 1/50 dilution for 25 percent vaccine, etc.), intraperitoneally, every second day for 6 doses. Eighteen control mice should be set aside at the start of the test. Fourteen days from the first dose of vaccine the test dose should be given to both vaccinated and control mice. In preparation for this at least 3 normal mice should be given 0.03 cc. of a 10 percent emulsion of the fixed virus strain about 7 days after the first dose of vaccine. These mice will then come down with fixed virus rabies just in time for the test dose. These 3 mice should be killed on the first day of definite symptoms and the brains should be removed and kept at 0° C. until used. On the fourteenth day these mouse brains

are emulsified at 1/10 dilution by weight with 10 percent horse serum in distilled water. The 10 percent emulsion is centrifuged at 1,000 r. p. m. for 10 minutes. The supernatant is then carried through serial tenfold dilutions from 10^{-1} to 10^{-7}. In order to determine the M. L. D. of the test virus the 18 control mice are divided into 3 equal groups and given, intracerebrally, 0.03 cc. of the 10^{-5}, 10^{-6}, and 10^{-7} dilutions. Groups of 6 vaccinated mice should be given 0.03 cc., intracerebrally, of the 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, and 10^{-5} dilutions. These mice should be observed for 21 days and only those showing symptoms of fixed virus rabies before death should be considered as rabies deaths. The M. L. D. is the highest dilution given the control mice which causes death from rabies in at least 3 of the 6 injected mice. The end point of the immunity in the vaccinated mice is the lowest dilution of test dose virus in which at least 3 of the 6 mice tested survive. The number of M. L. D. protected against can be determined easily by the number of times the dilution giving the end point in the vaccinated mice is more concentrated than that in the controls. With irregular results 50 percent end points should be determined for control and vaccinated groups by the method of Reed and Muench (*10*).

The technique described is applicable with all the types of killed virus vaccines (phenolized, formalized, etherized, chloroform-killed, heat-killed, etc.) in which all the human doses are identical.

For those vaccines utilizing live or attenuated virus (Pasteur, Hogyes, Harris) the mouse test can also be used in a modified form. The 6 intraperitoneal injections given the mice must be graded so that each successive dose contains more and more virulent material, as is done in human vaccination with the same vaccines.

Having enumerated the requirements of the ideal test at the beginning of this paper we shall now examine the mouse test here recommended in relation to those specifications.

Although the test conditions are admittedly dissimilar to clinical conditions obtaining in the human use of rabies vaccine, we feel that we have demonstrated that a vaccine showing antigenic power by the mouse test will also be efficacious in the post-infection treatment of rabies, as shown in the experiment with guinea pigs. Or perhaps it would be more exact to state that a vaccine giving a high degree of immunity, as measured by the mouse test, will be of more value clinically than one giving less immunity in mice.

The technique is simple and, if a few precautions are observed in giving the intracerebral test dose, there is no procedure in which individual differences of the technician can cause appreciable variations in the results.

We feel that the time required for this mouse test (5 weeks) is as short as it is possible to make any test of rabies immunity, and it is certainly shorter than most tests used in the past.

Results are uniform in identical tests except in those vaccines giving but borderline immunity. This disadvantage may be overcome by making the required degree of immunity (number of M. L. D. protection) sufficiently high. Since the basis of determining the end point of the test is the death of mice with symptoms of rabies there should be no difficulty in interpreting results.

The test animals, Swiss white mice, are easily available, inexpensive, and easily cared for in the laboratory.

The test dose material is the same virus being carried for the production of vaccine and therefore will be uniform from one test to the next and any change in its virulence will be detected in the control mice where it is titered each time the test is performed.

How many M. L. D. protection by the mouse test is necessary for a vaccine to be of value in clinical use? At present this question cannot be answered definitely. However, in view of the possibility of irregular results in those vaccines giving but a small degree of immunity and the fact that some vaccines are capable of protecting against as high as 50,000 M. L. D., immunity against at least 1,000 M. L. D. in the mouse test should be considered the minimum requirement of an efficient rabies vaccine.

References

(*1*) Webster, L. T.: The immunizing potency of anti-rabies vaccines. A critical review. Am. J. Hyg., **30:** 113 (1939).
(*2*) Reichel, J., and Schneider, J. E.: Response to rabies vaccine as shown by protection tests. Am. J. Pub. Health, **26:** 789 (1936).
(*3*) Reichel, J., and Schneider, J. E.: Vaccine protection test. Am. J. Pub. Health, **24:** 625 (1934).
(*4*) Webster, L. T.: A mouse test for measuring the immunizing potency of anti-rabies vaccine. J. Exp. Med., **70:** 87 (1939).
(*5*) Stuart, G., and Krikorian, K. S.: Rabicidal antibody content of rabbit immune serum as index of acquired resistance to infection. J. Hyg., **32:** 489 (1932).
(*6*) Cruvielhier, L., and Viola, C.: Rabicidal power of serum and antirabic immunity. Ann. Inst. Pasteur, **59:** 207 (1937).
(*7*) McKendrick, A. G.: An eighth analytical review of reports from the Pasteur Institute on the results of anti-rabies treatment. Quart. Bull. Health Organization of League of Nations, **7:** 1 (1939).
(*8*) Casals, Ariet J., and Webster, L. T.: Age factors in susceptibility and immunizability of mice to rabies virus. J. Bact., **39:** 66 (1940).
(*9*) Milam, D. F.: Effect of various diluents acting for short periods on rabies virus in high dilutions. Am. J. Trop. Med., **19:** 297 (1939).
(*10*) Reed, L. J., and Muench, H.: A simple method of estimating 50 percent end points. Am. J. Hyg., **27:** 493 (1938).

HELIUM-OXYGEN MIXTURES FOR ALLEVIATION OF TUBAL AND SINUS BLOCK IN COMPRESSED AIR WORKERS [1]

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The Division of Industrial Hygiene of the National Institute of Health, United States Public Health Service, conducted a field study

[1] From the Division of Industrial Hygiene, National Institute of Health.

on compressed air illness at the Queens Midtown Tunnel in New York City from July 1938 to May 1939, in cooperation with the United States Bureau of Mines, the New York Tunnel Authority, and the Walsh Construction Co. During the course of this study a by-product of the investigation was developed which has gained increasing interest in the field of compressed air work. Inasmuch as the publication of the formal bulletin will be delayed for some time it was suggested that the work done on helium-oxygen mixtures for relief of tubal and sinus block be produced in a separate article, which is accordingly presented here.

Helium-oxygen mixtures have been suggested for the treatment and prophylaxis of compressed air illness almost since the time of recognition of the properties of helium. J. C. McLennan (*1*) stated that the use of this gas in conjunction with oxygen was suggested by Elihu Thompson for divers so that "the period of submergence as a consequence might be considerably increased." Charles Cooke (*2*) in 1923 was granted a patent for the use of helium with oxygen for divers, based on the fact that helium has a coefficient of solubility approximately one-half that of nitrogen and because it is twice as diffusible. Sayers, Yant, and Hildebrand (*3*) in 1925 stated: "Helium is without odor or taste and has physical properties which promise to be of interest physiologically and which have been found to have possibilities of great practical use, especially in making a synthetic atmosphere that will reduce the hazard of caisson disease. The substitution of helium for the nitrogen ordinarily present in the air we breathe has been found to result in an atmosphere which is as respirable as that provided by nature. The results obtained indicate that helium not only has the advantage of being less soluble than nitrogen, but also has the advantage of diffusing more rapidly in the body fluids and tissues which results in rapid elimination of the gas from the tissues during decompression."

Sayers and Yant in 1926 (*4*) gave a more comprehensive account of their work which indicated the efficacy of helium in preventing compressed air disease, in shortening decompression time, and showed the safety of its use. The physiologic properties and the therapeutic application of helium have been demonstrated by Behnke and Yarbrough (*5*) and by A. L. Barach (*6*). Helium has never been used for ordinary decompression in caisson or tunnel work, however, since the cost is prohibitive. It is used in diving operations, although to no great extent as yet, being limited usually to dives of great depth or of long duration, and chiefly by the United States Navy. Edgar End (*7*) in 1938 reported a fresh-water dive of 420 feet with the use of an 80-percent helium and 20-percent oxygen mixture during which there were no toxic symptoms manifest and following which no symptoms of compressed air illness were noted.

Work in this direction was not pursued in this field study since the amount of helium necessary to carry on an experiment of such large proportion would be almost out of the question, and because pure oxygen could be used with no danger at the pressures under which the men were decompressed (*8*, *9*). The report regarding decompression of compressed air workers using pure oxygen will be published at a later date.

An effort was made, however, to relieve that condition known in compressed air work as "ear block." This subjective complaint of pain or discomfort in the ears is a distinct entity encountered in compressed air work and entirely separate from that known as compressed air illness. It was first described in detail by Armstrong and Heim in 1937 (*10*), who observed the condition in aircraft pilots. They suggested the term aero-otitis media and defined it as "an acute or chronic traumatic inflammation of the middle ear caused by a pressure difference between the air in the tympanic cavity and that of the surrounding atmosphere, commonly occurring during changes of altitude in airplane flights and characterized by inflammation, discomfort, pain, tinnitus, and deafness." The condition which they described and toward which they directed attention as a new clinical entity is identical with the changes observed in compressed air workers suffering from "ear block."

Detailed description of the anatomy and normal and special physiology of the middle ear and eustachian tube indicated that aero-otitis media is due to lack of ventilation of the middle ear, and is caused by failure or inability to open the eustachian tube voluntarily when necessary.

The same authors (*10*) also listed the objective signs of this condition. These are essentially the same as those observed in affected compressed air workers. "The objective signs depend on the amount of trauma sustained. In mild cases the drum may appear normal except for a moderate degree of bulging or retraction when a small amount of pressure differential still persists. An increased pressure in the tympanic cavity is denoted by a bulging of the tympanic membrane with a loss or decrease of the light reflex.

"A negative pressure in the tympanic cavity is denoted by a retraction of the tympanic membrane with a decrease in size and brilliance of the light reflex and an increased prominence of the short process of the malleus with a foreshortened and more horizontal handle.

"Following more severe trauma the drum may be retracted or bulging as already described, and in addition there is also an inflammation, which in appearance varies from a slight pink tinge to an angry red. In all cases the inflammation is most marked along the larger vessels

that follow the malleus handle and around the drum periphery. When the inflammation is severe it cannot be distinguished from acute infectious otitis media and has frequently been mistaken for it.

"Traumatic ruptures of the tympanic membrane are usually linear and quite extensive. * * *"

The chronic phase of aero-otitis media is also seen in compressed air workers and is described by Armstrong and Heim (*10*) as follows: "The drum membrane is dull, lusterless and slightly thickened and the light reflex is diminished or absent. Hearing acuity is diminished either unilaterally or bilaterally and in the latter case there is usually a considerable difference between the two sides."

In compressed air workers the condition might advance to a frank otitis media if relief of the block is not afforded promptly. The acute condition might also regress within a few hours.

The ears, however, may not be involved, but an obstruction of one or more of the ostia of the accessory nasal sinuses may produce a severe pain in the area of the affected sinus. The only objective sign in sinus block may be a small amount of bleeding from the nose. If relief from this condition is not afforded, the pain continues and an acute sinusitis is likely to develop. Tubal and sinus blocks are most commonly encountered in workers with upper respiratory infection, while the tubal block [2] is more common in workers in apparently good health.

The eustachian tube is a ventilating shaft and drainage canal from the middle ear to the posterior pharynx. It is normally collapsed but in acts such as swallowing or yawning the dilator muscles with which it is supplied contract and the tube is opened. Thus, without any conscious effort, the air pressure on either side of the tympanic membrane is kept in equalization at all times. Another means of opening this tube is to use the Valsalva method, that is, to close the nose and mouth tightly and to attempt to expire forcefully, thus increasing pressure in the pharynx and forcing air up to the middle ear via the eustachian canal.

In "locking in" the compressed air worker must consciously or unconsciously continuously equalize the pressure in his accessory sinuses and middle ear. Some of the workers appear to be doing nothing to equalize this pressure, but in these cases it will usually be noted that they hold their lower jaws in a slightly extended position, and hold their tongues away from the roof of the mouth and posterior or soft palate. In this way they dilate the eustachian tube slightly and the air readily passes up to the middle ear. Many of the workers

[2] The terms tubal and sinus block are preferred in this instance because it is primarily the "block" which precipitates the sinusitis or the condition described by Armstrong and Heim. It is the purpose of the apparatus described later to forestall an aero-otitis media or sinusitis by relieving the "block." It is felt that treatment of the traumatic or infectious inflammation should proceed at present along already well-established methods of therapy.

swallow while locking in, but the majority use the Valsalva method. These men enter the tunnel in gangs of 30 to 50 in number and if one man acquires a "block," the inrushing air must be shut off at once, and the pressure is usually lowered. Then a second try is made, and if not successful this time, the worker must leave the lock. This, of course, necessitates the return to normal pressure by the whole gang. This "bouncing up and down," or fluctuation of the pressure often precipitates a "block" in one or more men of the gang attempting recompression after the first worker has been "locked out." In addition to being time consuming and wasteful of the compressed air, it is very trying on the men themselves.

Oftentimes, rather than lose a shift or be ridiculed by his mates, a worker will "force himself through," that is, he will endure the pain and discomfort in the hope that it will right itself in a short time. These are the cases which are more prone to develop an otitis media, often with subsequent suppuration. These cases, too, are the ones in which rupture of the ear drum may occur.

Let us now follow the worker who was "locked out." He blows and snorts and goes through various contortions, at the end of which his head may or may not feel clearer. If the man lock is not yet available, he will usually attempt to get into the tunnel through the muck lock in which the pressure is raised and lowered with great speed since only materials for construction are supposed to pass through. Here again he runs a chance of developing a suppurative otitis media or a ruptured tympanum. Sometimes he attempts to go through the emergency lock, but this is used frequently and may not be available, or he may not know how to manipulate the controls. Here, too, if he is not careful a rupture of the drum may occur, because the emergency lock is small and the pressure increases rapidly unless the controls are handled with skill.

The regulations imposed by the contractor's physician request the worker to return to the surface and to the medical dispensary immediately after being "locked out" for a "block." However, he usually does not do this until all other methods have failed, chiefly because of the distance between the man lock and the dispensary, and the time involved in travelling back and forth. If he does report to the physician on duty, a series of shrinking solutions will be placed far back in his nose and throat, which may or may not be efficacious in breaking the block.

During this study a method of eliminating these conditions was tried out. Helium is the lightest of all the elements except hydrogen; it is inert and can be used safely as a component of a respirable gas. Lovelace and Mayo (*11*), in February 1939, described a treatment for alleviation of aero-otitis media in which a helium-oxygen mixture was used. With reference to the velocities of the molecules under

discussion they stated: "The rate of diffusion of helium is 2.7 times that of nitrogen. The mean velocity of the oxygen molecule at 0° C. and a pressure of 760 mm. Hg is about 0.425 km./sec., of the nitrogen molecule 0.453 km./sec., and of the helium molecule 1.202 km./sec." It is probable, therefore, that in a respirable gas mixture composed of oxygen and helium, the latter should diffuse through an accessory nasal sinus ostium or the eustachian tube more rapidly than would the nitrogen of air. Thus the equalization of pressure between the middle ear and the external barometric pressure should occur more readily.

The mucous membrane lining the upper respiratory passages is a delicate tissue. It is sensitive to environmental or atmospheric and physiologic changes and is subject to infection with all its concomitant phenomena. Mild inflammation and congestion are therefore not uncommonly noted in an otherwise healthy individual. Under ordinary atmospheric conditions, equalization of pressure between the accessory nasal sinuses and the middle ear with the external atmosphere is accomplished with little or no difficulty. If there is a rapid change in external atmospheric pressure, however, it seems reasonable to assume that the rapid influx of air and the increased pressure upon the ostia and tubal openings might cause a puckering of the congested and boggy mucous membrane of these entrances and so produce a valve-like block. The presence of a thick mucoid discharge might also be an added factor of mechanical obstruction. As the external pressure is increased, there is a negative pressure produced in the cavities which draws the walls of the openings together and further aids in the exclusion of the outside air. The natural warning of such a situation is the occurrence of pain in the affected ear or sinus. It should be recalled that any change in atmospheric pressure is transmitted immediately to the blood stream. The pain probably arises from the distention of the blood vessels supplying the membrane lining the cavity which is now under a negative pressure, that is, a pressure less than that of the blood vessels themselves. When a tubal block occurs, pain is also caused by stretching of the ear drum owing to increased or decreased external pressure. Should the negative pressure within the cavity be maintained, natural forces will be set in motion to equalize the pressure with that of the external atmosphere. Since immediate equalization is not possible by means of a gaseous medium, attempts at equilibrium will be made by means of a liquid medium brought about by extravasation of blood or serum into the cavity with the negative pressure. The presence of free blood or serum in an area accessible to, or in which there may be pathogenic organisms, favors the development and progress of infection.

A return to the original atmospheric pressure will permit the establishment of former conditions and the ostia and openings might again

become patent. If the condition has been maintained for too long a time or if too vigorous methods have been applied to break the block, the openings may remain closed and gas interchange and fluid drainage will not be possible.

It should be noted that the above described phenomena may take place when the external atmospheric pressure is either raised or lowered, except that extravasation of blood or serum is not likely to occur in the lowering of the external pressure. The cavity in that case will be under increased pressure and pain will be caused by the pressure of the expanding gases within the cavity against the mucous membrane lining. The occurrence of tubal or sinus block is infrequent when the external pressure is lowered because (1) decompression is usually performed with less speed than compression, and (2) the anatomy of the involved parts facilitates the exit rather than the entrance of gases.

If a respirable mixture of helium and oxygen is breathed after the ostia and tubal openings have re-established their patency, the lungs and upper respiratory passages will become filled with the new mixture. When a change in atmospheric pressure is now attempted, puckering, closure, and adhesion of the openings will be less probable for two reasons: (1) The establishment of a state of equilibrium between the helium-oxygen filled cavities and the nitrogen-oxygen gas mixture of the outside atmosphere will now become necessary; and (2) the speed of the helium molecule, which is 2.7 times that of nitrogen, will aid the forces operating to bring about this equilibrium. In addition to the employment of voluntary methods, therefore, the operation of forces demanding an equilibrium of the gaseous mixtures will bring about an equalization of pressure in the tympanic cavity and accessory nasal sinuses.

A simple apparatus was designed by the United States Bureau of Mines Laboratories which could be used by the worker in the man lock. It consists of a small cylinder of 80 percent helium and 20 percent oxygen connected through a small reducing valve to a "lung" or breathing bag adapted from a 2-hour self-contained oxygen breathing apparatus frequently used in mine rescue work. The breathing bag is equipped with an admission valve which is automatically tripped when the bag collapses. Attached to the bag is a rubber tube on the end of which is a detachable face mask. The whole apparatus is no larger than a small suitcase and can be left permanently in the man lock in charge of the lock tender.

Because this apparatus was not immediately available a temporary one was constructed by utilizing an oxygen breathing apparatus of a type used in mine rescue work, but exhaling to the outside air and attaching to a large cylinder of the helium-oxygen mixture. A small detachable face mask was substituted for the full face mask of the

original machine. This apparatus was too large and unwieldy to remain in the man lock and was placed in the checker's shanty just outside. Its use still necessitated the return to normal pressure. The "locked out" worker could breathe this mixture and after he had breathed it two minutes or less, the lock tender could return for him and take him on through. In this way a series of 84 recorded cases were treated, 82 of which were able to re-enter the tunnel and to continue their work with no discomfort or danger to themselves.

Two cases of this series failed to respond sufficiently to pass through the lock; one was a worker who had been out of compressed air for 2 weeks and who was suffering from a subacute pansinusitis and the other was one of our own staff who had never had any experience in compressed air before and who had a chronic catarrhal sinusitis. In the latter instance no attempt was made to break the "block" by means of the helium-oxygen mixture until 30 hours after its occurrence.

When the smaller apparatus was available it was placed in the hands of the contractor for use in the man lock. Individual cases were not recorded at this time and no accurate record of results is available. This method can probably be made more efficient and practicable than keeping the apparatus outside the lock. When a "block" occurs while the gang is "locking in," the air is shut off and the pressure is reduced a pound or two. The apparatus is automatic and ready for instant use. No manipulation is necessary once the machine is set. The affected worker applies the mask and breathes normally for one minute or a little more, and usually the "block" is broken. He can then go on through either still using the mask or not as necessity demands.

This procedure should save considerable time, both for the worker and the employer, in addition to obviating the danger and discomfort of the disabling tubal or sinus block.

In "locking out," a "block" is not so likely to occur, but occasionally it does. Here, too, the same method may be used. A few inhalations of the helium-oxygen mixture permits decompression to continue in the regular manner.

SUMMARY

1. Some of the physical and physiologic properties of helium have been enumerated, together with a reference to the safety of its use in prevention and prophylaxis of compressed air illness.

2. A description is given of another entity encountered in compressed air work known as "ear block," more properly termed tubal or sinus block.

3. The occurrence of tubal or sinus block as observed in the compressed air worker and the conditions which promote this occurrence are described.

4. The theory of the mechanism of "block" and its alleviation by means of helium is explained.

5. A new and simple apparatus as designed by the United States Bureau of Mines Laboratories is presented for the relief of tubal and sinus block by administration of 80 percent helium and 20 percent oxygen.

6. The use of this apparatus in the man lock itself is strongly urged in order to prevent the occurrence of more serious complications of "block." Also, this will obviate the necessity of fluctuation of pressure which frequently precipitates a "block" in one or more men attempting recompression after the first worker has been "locked out."

7. The use of an improvised apparatus in the field study produced results indicating a high degree of efficacy in the prevention of tubal and sinus block. Experience with this apparatus also indicated that once the "block" is complicated by inflammation, from whatever cause, the helium-oxygen administration is not likely to be effective, and that complications following "block" should be treated by well-established therapeutic measures.

8. It is suggested that with limited instruction to the workers the use and value of this apparatus will be recognized, since manipulation is unnecessary and the results are rapid and convincing.

ACKNOWLEDGMENTS

Acknowledgment and deep appreciation are accorded to Mr. F. E. Griffith and Mr. H. A. Watson of the United States Bureau of Mines for their invaluable work in the development and use of the apparatus herein described; to Dr. Edward Levy of the Port of New York Authority for his suggestion regarding the development of an apparatus for alleviation of tubal and sinus block; to Dr. G. C. Emory for permitting the use of the new apparatus on employees under his care and for his helpful suggestions throughout the study; to members of Local 147, Compressed Air, Tunnel, Caisson, Subway, Cofferdam, and Sewer Construction Workers Union; and members of the engineering staff of the New York Tunnel Authority who submitted to the new method of treatment. The apparatus used by the contractor on this study was constructed by the Mines Safety Appliances Company, of Pittsburgh, with suggestions for design by the United States Bureau of Mines Laboratories.

REFERENCES

(*1*) McLennan, J. C.: Helium production and uses. Nature, **105**: 778–780 (1920).
(*2*) Patent No. 1,473,337, U. S. Patent Office.
(*3*) Sayers, R. R., Yant, W. P., and Hildebrand, J. H.: Possibilities in the use of helium-oxygen mixtures as a mitigation of caisson disease. U. S. Bureau of Mines, Report of Investigations No. 2670 (1925).
(*4*) Sayers, R. R., and Yant, W. P.; The value of helium-oxygen atmosphere in diving and caisson operations. Anesth. and Anal., **5**: 127 (1926).
(*5*) Behnke, A. R., and Yarbrough, O. D.: Physiologic studies of helium. U. S. Naval Bulletin, **36**: 542 (1938).

(6) Barach, A. L.: The therapeutic use of helium. J. Am. Med. Assoc., 107: 1273 (1936).
(7) End, E.: The use of new equipment and helium gas in a world record dive. J. Indust. Hyg. and Tox., 20: 511 (1938).
(8) Behnke, A. R., Forbes, H. S., and Motley, E. P.: Circulating and visual effects of oxygen at 3 atmospheres pressure. Am. J. Physiol., 114: 436 (1936).
(9) Bornstein, A., and Stroinke, H.: Ueber Sauerstoffvergiftung. Deut. med. Wchnschr., 38: 1495 (1912).
(10) Armstrong, H. G., and Heim, J. W.: Effect of flight on the middle ear. J. Am. Med. Assoc., 109: 417 (1937).
(11) Lovelace, W. R., Mayo, C. W., and Boothby, W. M.: Aero-otitis media: Its alleviation or prevention by inhalation of helium and oxygen. Proc. Staff Meet. Mayo Clin., 14: 91 (1939).

TWO EPIZOOTICS OF PLAGUE INFECTION IN WILD RODENTS IN THE WESTERN UNITED STATES IN 1938

By L. B. Byington, *Surgeon, United States Public Health Service, Plague Suppressive Measures Laboratory, San Francisco, Calif.*

In the course of field investigations of plague during the summer of 1938, two small outbreaks of considerable intensity involving wild rodents were observed. One occurred in Lincoln County, Wyo., the other in Catron County, N. Mex. The Wyoming outbreak appeared to be a direct extension of the disease from infected animals in nearby Idaho and Utah. The New Mexico epizootic took place more than 150 miles from any other known plague-infected region.

PLAGUE INFECTION IN LINCOLN COUNTY, WYO.

Lincoln County is situated on the western border of the State and adjoins both Idaho and Utah. The surface is a rough, rocky, and sandy intermountain plateau covered with sagebrush. Most of the land is not inhabited, but there are a few narrow fertile valleys utilized for farming and some grazing land. Coal mining is the chief industry. There are nearly as many persons engaged in mining as in agriculture. Most of the population is distributed along the Union Pacific Railroad and U. S. Highway 30N. in the southern third of the county, and it was here that the plague infection in rodents was observed. The principal towns are Kemmerer, a mining center and railroad division point, with a population of 1,834; Diamondville, near Kemmerer, with a population of 812; and Cokeville, near the Idaho boundary, with 431 inhabitants. The population density for the entire county is 2.5 persons per square mile, but must be considerably greater in the area under discussion.

Early in July 1938 the personnel of a mobile laboratory investigating plague infection in that region were advised of an unusual mortality in ground squirrels in the vicinity of Cokeville. Residents reported that, 3 or 4 weeks previously, dead ground squirrels had been seen in an

abandoned sheep corral 6 miles north of that town. Investigation revealed the presence of plague infection in Uinta ground squirrels (*Citellus armatus*), Wyoming ground squirrels (*Citellus richardsonii elegans*) and woodchucks (*Marmota flaviventris*). Between July 2 and August 12, 1938, 37 plague-infected rodent specimens were obtained from a total of 115 specimens taken; i. e., 32.2 percent of the specimens were plague infected. All were taken from an area approximately 40 miles square. At the same time 12 additional plague-positive specimens were taken from scattered adjacent areas not included in this report. The distribution of plague in the rodent hosts is given in table 1.

It will be observed that these numbers refer to specimens and not to individual animals. A specimen represents from 1 to 150 rodents of the same species collected at one time from one locality from which the ectoparasites were pooled for subsequent guinea pig inoculation. By this procedure a specimen found to be plague infected was assumed to contain only one infected animal, although it is possible that several of the rodents contributing to a specimen may have been infected. Specimens consisting of only one animal were limited to this number because the autopsy findings suggested plague in that particular rodent. Eighteen of the 37 plague-positive specimens consisted of only one animal. The range in the number of animals per specimen is indicated by table 2.

TABLE 1.—*Distribution of plague in rodent hosts, Lincoln County, Wyo., 1938*

Animal	Number of specimens	Number plague infected	Number negative	Percent infected
Uinta ground squirrel (*Citellus armatus*)	56	31	25	55 3
Wyoming ground squirrel (*Citellus richardsonii elegans*)	29	5	24	17 3
Woodchuck (*Marmota flaviventris*)	7	1	6	14 3
Prairie dog (*Cynomys leucurus*)	23	0	23	0
Total	115	37	78	32 2

TABLE 2.—*Median and average numbers of animals included in one specimen of rodents, Lincoln County, Wyo.*

Animal	Plague-positive specimens		Plague-negative specimens	
	Median	Average	Median	Average
Uinta ground squirrel (*Citellus armatus*)	15	29	40	43
Wyoming ground squirrel (*Citellus richardsonii elegans*)	31	35	15	16
Woodchuck (*Marmota flaviventris*)	1	1	12	17
Prairie dog (*Cynomys leucurus*)	0	0	2	2

The geographic distribution of the plague-infected rodents in the area described is shown in figure 1. Most of these animals were shot

or found dead in the rural or desert districts, but some were obtained from urban areas and one plague-infected rodent was killed on a golf course.

The course of the epizootic is indicated by figure 2. Although the chronologic distribution of the series somewhat resembles a normal curve, information indicates that the outbreak had been in progress for several weeks before any animal samples were obtained. The parasite-host relationship was investigated and will be reported later. There were no cases of plague in man.

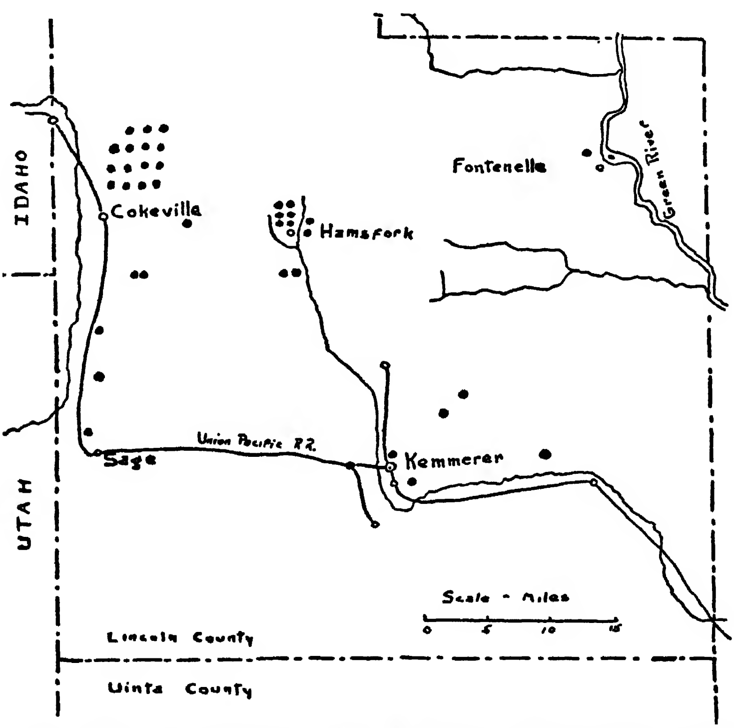

FIGURE 1.—Map of part of Lincoln County, Wyo., showing distribution of plague-infected rodent specimens obtained in 1938.

PLAGUE INFECTION IN CATRON COUNTY, N. MEX.

Catron County is situated on the western border of the State, midway from north to south. The southern part of this county consists of high, rugged mountains; the northern part is a desert mesa. The county is thinly populated, having an area of 7,042 square miles and a population in 1930 of 3,282, or a density of 0.4 persons per square mile. Fewer than 800 persons in the county are engaged in farming. The largest town is Mogollon, with a population of 295. Reserve, the county seat, has 206 inhabitants.

In April and May 1938 Mr. J. C. Gatlin, of the United States Biological Survey, noted an unusual mortality in prairie dogs in northern Catron County and reported that fact to the Plague Suppressive Measures Laboratory of the Public Health Service in San Francisco, Calif. The collection of specimens was begun in that area on August 6, and between that date and September 26, 23 plague-infected specimens were obtained from a total of 49 secured. The distribution of this infection, by hosts, is given in table 3, and the variation in size of the samples is shown in table 4.

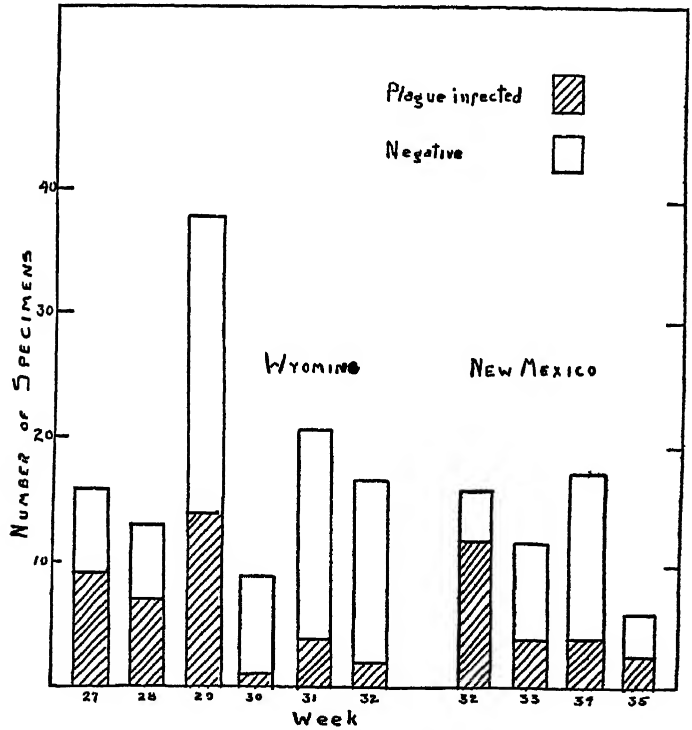

FIGURE 2.—Frequency of plague-infected specimens in total number of specimens of wild rodents obtained in Lincoln County, Wyo.; and Catron County, N. Mex., in 1938, by weeks.

TABLE 3.—*Distribution of plague in rodent hosts, Catron County, N. Mex., 1938*

Animal	Number of specimens	Plague infected	Number negative	Percent infected
Say's rock squirrel (*Citellus variegatus grammurus*)	6	1	5	16.6
White footed mouse (*Peromyscus truei truei*)	1	1	0	100.0
Zuni prairie dog (*Cynomys gunnisoni zuniensis*)	42	21	21	50.0
Total	49	23	26	46.9

TABLE 4.—*Median and average numbers of animals included in one specimen of rodents, Catron County, N. Mex.*

Animal	Plague-positive specimens		Plague-negative specimens	
	Median	Average	Median	Average
Say's rock squirrel (*Citellus variegatus grammurus*)	1	1	1	1
White footed mouse (*Peromyscus truei truei*)	1	1	0	0
Zuni prairie dogs (*Cynomys gunnisoni zuniensis*)	1	6	11	11

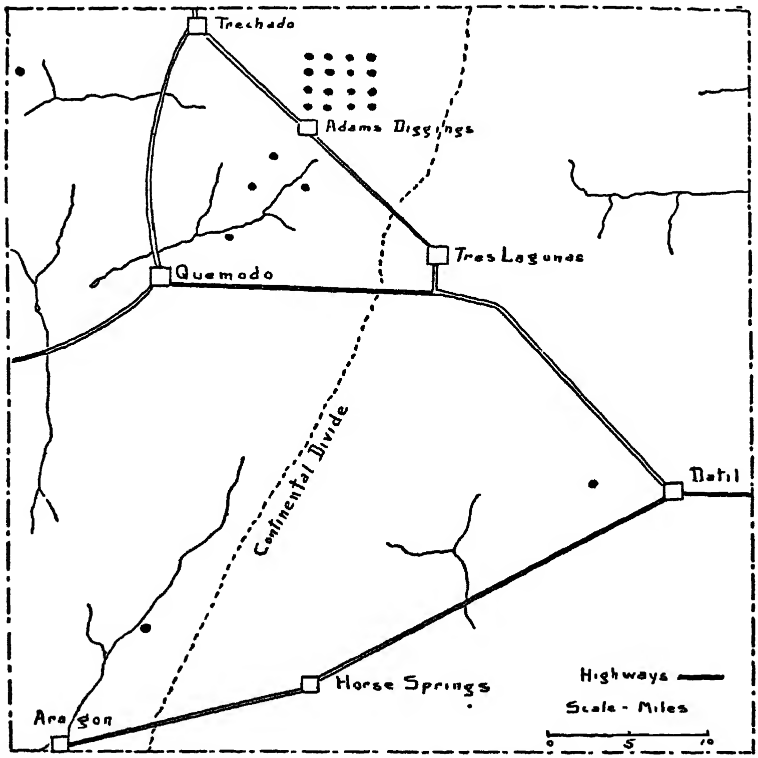

FIGURE 3.—Map of part of Catron County, N. Mex., showing distribution of plague-infected rodent specimens obtained in 1938.

It will be observed that plague infection was found in nearly one-half of the samples collected.

The chronologic course of the outbreak is suggested in figure 2. The declining course of the curve resembles that of the terminal portion of an epidemic and it is known that this study was not begun until several months after unusual rodent mortality was observed. Apparently this epizootic started in April and continued until the end of September.

The geographic distribution of the infection is shown in figure 3. No human cases of plague were reported in connection with this

epizootic. One year after this outbreak, a resurvey of this region was made. No plague-infected animals were found at this time in the area originally found infected but several plague-positive specimens were taken from Valencia County, north and west of Catron County, suggesting the gradual spread of enzootic plague in that direction.

Two years after the epizootic another study failed to demonstrate any infected animals in that part of the State.

CONCLUSION

Epizootic outbreaks of plague in rodents are occurring in the western United States. These are part of a widespread enzootic of the disease in many species of rodents. The two outbreaks here reported took place in regions sparsely inhabited by man and no human cases were known to have been associated with the infection in rodents.

(NOTE.—The surveys in 1938 and 1939 were performed under the supervision of Senior Surgeon Clifford R. Eskey, who was at that time in charge of the Plague Suppressive Measures Laboratory. The field work was supervised by Passed Assistant Surgeon V. H. Haas and Assistant Surgeon Wixom Sibley.

CARE OF THE EARS AND PREVENTION OF DEAFNESS[1]

General Statement.

Comparatively few people are aware of the extent of the problem of deafness.

The results of examinations of school children indicate that about 15 percent, or one in every six or seven children, has some impairment of hearing. Conservative investigators state that about half of these children (6 percent) suffer serious hearing loss. It has been estimated that one-third of all adults have some deafness in one or both ears. In this connection, it is highly important for the public to realize that the majority of causes which lead to deafness are preventable.

The working parts of the organs of hearing are delicate structures and, if they are to function efficiently, must be given competent care.

Parts of the Ear.

The *external ear*, or *pinna*, is the visible portion of the ear which serves as a funnel to aid in the collection of sound waves.

The *external auditory canal* extends from the outer ear to the drum membrane. It is lined with fine hairs, and glands which produce

[1] This material is available in leaflet form and may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

sweat and wax. Through this canal sound waves and outside air pressures reach the eardrum.

The *drum membrane* conveys the vibrations produced by sound waves to the chain of delicate bones in the middle ear.

The *middle ear* is an air-filled chamber lying between the drum membrane and the internal ear. It contains the ossicles (tiny bones) and nerves concerned in the transmission of sound.

The *internal ear* contains the semicircular canals, and other organs for maintaining the body in a state of balance, and the cochlea which is concerned with the function of hearing.

The *eustachian tube* is a tiny passage which connects the middle ear with the nasopharynx, the space formed by the after part of the nose and the upper part of the throat. Normally, the eustachian tube conveys air at outside pressure to the middle ear, thus equalizing the air pressure on both sides of the drum membrane. In health, air is admitted into the middle ear through the eustachian tube by the acts of swallowing and yawning.

Conditions of the Auditory Canal.

1. *Foreign bodies in the ear.*—Foreign bodies in the outer ear canal at times cause only slight discomfort. Occasionally buttons and similar small smooth objects are removed from the ears of adults which were evidently placed in the ears during childhood. No unskilled person should attempt to remove foreign objects from the ear. Improper, rough handling frequently pushes the object more deeply into the ear and, in some cases, the drum membrane may be seriously damaged.

When an insect gets into the ear, filling the canal with tepid water or glycerin may float the insect out. If this measure fails, expert medical assistance should be secured.

2. *Ear wax.*—Ear wax in moderate amount is a normal secretion of the glands in the external ear canal. It serves as a sticky protection against the entrance of dust and crawling insects. When ear wax dries, it tends to be dislodged by the movements of the jaws. In some individuals the wax remains soft and tends to accumulate in the canal. At times the collection of wax may be so great as to interfere temporarily with hearing.

Under no circumstances should hairpins or any pointed instrument be introduced into the ear canal in an effort to remove wax. To do so may injure the lining of the canal and lead to infection. Hardened wax may be pushed farther into the canal with resulting injury to the drum membrane.

In many instances, softening the wax with glycerin, followed by gentle syringing of the ear with warm water or weak salt solution, will remove the accumulation of wax. In syringing the ear, the fluid

should be introduced slowly against the back wall of the canal and with very little pressure. After washing the ear out, the head should be turned on one side so that the excess of fluid can run out. The canal may then be wiped out with a swab of cotton to clear it of moisture which, if left in the ear, will create conditions favorable to the growth of germs. Never introduce the swab far into the ear canal.

When these simple procedures fail to remove the excess wax, a physician should be consulted.

3. *Infections.*—The auditory canal is a favorable site for the development of certain skin infections, among which boils and fungus growths are common examples.

All infections of the auditory canal should receive the attention of a physician.

Infections of Middle Ear.

Infections of the middle ear are commonly caused by such germs as the streptococcus, the pneumococcus, and the staphylococcus. Enlarged adenoid tissue in children who suffer repeatedly with colds is the outstanding predisposing cause of middle ear infections. Forceful blowing of the nose, when the nose is stopped up, and especially when upper respiratory infection is present, may force infectious material into the eustachian tube and thus toward the middle ear. Serious infection may result.

Repeated inflammations in the upper respiratory tract often cause chronic enlargement of the adenoids and tonsils. These structures may then press upon the exit of the eustachian tube and interfere with its proper ventilation and drainage. This results in a condition which increases the likelihood of infection of the middle ear.

Infection of the middle ear commonly accompanies diseases such as pneumonia, influenza, whooping cough, measles, and scarlet fever. Repeated infections of the middle ear often result in permanent impairment in hearing. It is estimated that nearly 75 percent of deafness occurs before the fifth year, and that 9 out of 10 cases of deafness occur before the age of 20.

CAUTION: Individuals with chronic discharging ears are advised to remain under the care of a physician. A discharging ear is always a danger.

Eardrum membrane and ear infections.—Uninformed persons believe that a hole in the eardrum permanently interferes with hearing, and may cause other serious damage. Because of fear of having the drum opened, some parents postpone the proper treatment of middle ear infections, even though an accumulation of pus causes the drum membrane to bulge. As a matter of fact, when eardrum perforation is

properly and promptly made by the surgeon to relieve middle ear infection, the membrane usually heals as soon as the inflammation subsides, with no impairment of hearing which can be attributed to the incision of the drum. It is less dangerous to have the physician examine the eardrum and incise it when necessary than to permit the pressure of the pus to force its way into the spaces surrounding the ear. Waiting for a perforation to take place may increase the tendency of the infection to spread into the mastoid bone, which complication is a serious condition.

Educational Aspect of Problem.

Educational authorities have long recognized the educational problem of persons suffering severe degrees of handicap from defective hearing. Most States provide institutional care for the deaf where instruction in speech and lip reading and vocational training is provided. The sign language, also known as the manual method, is gradually being replaced by more modern methods.

The standardizing of hearing tests under properly controlled conditions has enabled investigators to discover early deafness more readily. It is felt that it is better not to segregate the hard-of-hearing children but to permit them to carry on their normal education with the addition of classes in special instruction. This makes more of the normal social contacts possible.

The provision of appropriate vocational training is essential for deaf and hard-of-hearing children. It is known that the range of occupations is considerably wider than that available for the blind.

Protective Measures.

1. Maintain good bodily health. This increases resistance against disease.
2. Avoid upper respiratory infections.
3. Secure prompt medical attention for every acute infectious disease to avoid ear complications.
4. Do not blow the nose violently.
5. Keep the ear canal clean, but observe every precaution not to damage its delicate structure.
6. Diseased or chronically enlarged tonsils, and nasal growths, including enlarged adenoids, should be given prompt medical attention. Whatever interferes with the maintenance of proper air pressure within the middle ear, or drainage through the eustachian tube, seriously endangers the delicate hearing apparatus.
7. Periodic and skillful testing of the hearing of all school children, with the provision of medical attention and special instruction to those found with defective hearing.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT. CONSULT YOUR DOCTOR

FLUORIDES IN FOOD AND DRINKING WATER[1]

A REVIEW

The endemic tooth hypoplasia known as mottled enamel is caused by drinking waters containing toxic quantities of fluorides. Fluorides also occur in some common foods. The results of a study of the effects of water-ingested sodium fluoride as compared with food-ingested sodium fluoride are presented in this bulletin. Findings show that for the growing rat the same quantity of sodium fluoride consumed in the food may be equal in toxicity to that consumed in drinking water. An acute toxic effect may be produced in the rat by 180 p.p.m. or more of fluorine when present in the drinking water, but not when present in the food. Judging from balance studies on growing rats, fluorine retention equals about 30 to 40 percent of the intake. The majority of this retained fluorine is deposited in the bones and teeth. The degree of tooth hypoplasia due to fluorosis in the rat is directly correlated with the quantity of fluorine present, 0.03 to 0.04 percent of fluorine representing the approximate maximum quantity that may be present in the whole tooth and the tooth enamel still retain its normal macroscopic appearance.

Although it is extremely difficult to judge the actual conditions of human ingestion, an accumulation of fluorine in the bones of adults living in areas where mottled enamel is endemic may be expected. An accumulation of abnormal and perhaps pathologic quantities of fluorine in the bones of adults living in these areas is probable. Further study of chronic fluorosis requires that emphasis be placed on the deposition of ingested fluorine in bones and teeth.

COURT DECISION ON PUBLIC HEALTH

Vaccination and compulsory education.—(Pennsylvania Superior Court; *In re Marsh, Appeal of Marsh,* 14 A.2d 368; decided June 25, 1940.) At the beginning of a school year a child of good health and compulsory school age was refused admission to a free, public school and sent home because of his failure to produce a physician's certificate setting forth that he had been successfully vaccinated or had previously had smallpox. The school authorities, in refusing admission, acted under a statutory duty. Thereafter, having been sent to school by his father, the child presented himself for admission almost daily for about 6 weeks, but each time he was rejected and

[1] National Institute of Health Bulletin No. 172. Fluorides in food and drinking water. A comparison of effects of water-ingested versus food-ingested sodium fluoride. By F. J. McClure. Available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at 15 cents per copy.

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sent home. At the end of that time a petition was filed by the school district attendance officer, in a court sitting as a juvenile court, for the production of the child on a charge of being a delinquent and neglected child. The child's father admitted his opposition to the vaccination of his son but sought to justify his unwillingness on the ground that the practice of vaccination was harmful and injurious. Also, no evidence was given at the hearing that the child was provided with any regular or systematic instruction.

The statute known as the juvenile court law included within its definition of a delinquent child one who was habitually truant from school or home and included within its definition of a neglected child one whose parent neglected or refused to provide proper or necessary education. The lower court adjudged the child to be a neglected child and committed him into the care and custody of a county child welfare service. An appeal to the superior court followed, and that court affirmed the order of the court below.

In passing on the appeal the superior court stated that the question was simply whether the child was a "delinquent" and "neglected" child within the meaning of the juvenile court law and said that the child could not reasonably be adjudged "delinquent" for the reason that the responsibility for continued absence from attendance at school could not properly be imputed to him. "It was," said the court, "the refusal and neglect of John Marsh to have his son vaccinated in accordance with the lawful requirements of the acts of 1895 and 1919 that prevented the latter's attendance at the public school." It was observed that the record contained no evidence indicating that the child was particularly unfit for vaccination or that vaccination, properly performed, was likely to result in harmful and injurious effects to him. There was quoted language from a United States Supreme Court case in which that court, in speaking of evidence in opposition to vaccination on the grounds that it was of little or no value in preventing smallpox or that it caused other diseases, said that it judicially knew that an opposite theory accorded with the common belief and was maintained by high medical authority. The view was taken that the father had the choice of permitting his son to be vaccinated and thereby qualify for admission to a public, private, or parochial school or of providing other adequate and systematic instruction, as for example, under a properly qualified private tutor, and thus avoid the requirement of vaccination. Having failed to do either, the father was deemed to have neglected or refused to provide proper or necessary education for his son.

DEATHS DURING WEEK ENDED AUGUST 3, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 3, 1940	Correspond-ing week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,763	7,114
Average for 3 prior years	7,258	
Total deaths, first 31 weeks of year	271,522	265,776
Deaths under 1 year of age	556	412
Average for 3 prior years	497	
Deaths under 1 year of age, first 31 weeks of year	15,684	15,797
Data from industrial insurance companies:		
Policies in force	65,006,071	66,862,304
Number of death claims	11,753	10,339
Death claims per 1,000 policies in force, annual rate	9.5	8.1
Death claims per 1,000 policies, first 31 weeks of year, annual rate	10.0	10.6

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 10, 1940

Summary

As compared with the preceding week, increases are shown during the current week for influenza, poliomyelitis, and typhoid fever, while decreases are reported for diphtheria, measles, meningococcus meningitis, scarlet fever, smallpox, and whooping cough. For the current week, influenza, measles, and poliomyelitis are slightly above the 5-year (1935–39) median expectancy.

Poliomyelitis is closely following the curve of seasonal incidence. For the country as a whole, 275 cases were reported for the current week as compared with 195 last week and with a 5-year median of 261. Current increases are recorded for all geographic areas except the West South Central, Mountain, and Pacific areas, the largest numbers of cases reported and the largest numerical increases being for the East North Central (43 to 92), West North Central (47 to 61), East South Central (8 to 20), and the South Atlantic (16 to 28). The largest numbers of cases were reported in Indiana (41), Michigan (31), Kansas (26), West Virginia (20), and Iowa (19).

The incidence of influenza, though not alarmingly high, has been persistently above the 5-year median so far this year. It is higher for the current week than for any corresponding period of the past 5 years, and the total number of cases to date is higher than that for the same period for each of the 5 preceding years with the exception of 1937.

During the current week, 31 cases of Rocky Mountain spotted fever were reported in the eastern and mid-western States, while only 1 case (in California) was reported west of the Rocky Mountains. Fifty-eight cases of endemic typhus fever were reported, principally in the eastern and southern States, and 7 cases of tularaemia, of which 6 occurred in Utah.

For the current week the Bureau of the Census reports 7,210 deaths in 88 major cities in the United States, as compared with 8,763 for the preceding week and with a 3-year (1937–39) average of 7,348 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended August 10, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	Aug. 10, 1940	Aug. 12, 1939		Aug. 10, 1940	Aug. 12, 1939		Aug. 10, 1940	Aug. 12, 1939		Aug. 10, 1940	Aug. 12, 1939	
NEW ENG.												
Maine	0	0	0	------	------	------	30	5	5	0	0	0
New Hampshire	0	0	0	------	------	------	1	3	2	0	0	0
Vermont	0	0	0	------	------	------	3	10	2	0	0	0
Massachusetts	6	3	6	------	------	------	191	50	50	0	2	1
Rhode Island	0	0	0	------	------	------	11	24	1	0	0	0
Connecticut	0	1	1	------	------	------	7	19	16	0	0	0
MID. ATL.												
New York	8	11	11	[1] 1	[1] 4	[1] 4	288	130	202	2	3	3
New Jersey [2]	2	4	4	2	1	3	124	14	41	1	0	1
Pennsylvania	10	17	16	------	------	------	118	42	76	1	4	4
E. NO. CEN.												
Ohio [2]	2	3	9	4	7	4	19	16	58	1	1	2
Indiana	7	5	8	2	2	4	6	1	8	0	0	2
Illinois [2]	11	23	17	4	4	4	58	15	30	0	0	2
Michigan [3]	5	6	12	4	------	------	153	39	60	0	1	1
Wisconsin	0	2	2	19	------	14	141	45	61	0	0	0
W. NO. CEN.												
Minnesota	0	1	2	------	------	1	14	11	8	0	0	0
Iowa [2]	2	4	3	------	1	2	30	21	5	0	1	2
Missouri [2]	0	0	5	------	------	25	2	0	4	0	0	0
North Dakota	7	3	2	------	------	------	1	2	2	1	1	0
South Dakota	0	1	1	------	1	------	1	3	2	0	0	0
Nebraska	2	0	1	------	------	------	1	0	1	0	0	0
Kansas	6	3	3	------	------	------	14	3	3	0	0	0
SO. ATL.												
Delaware	1	0	0	------	------	------	0	0	1	0	0	0
Maryland [2 3]	3	1	3	4	------	1	5	6	6	1	1	2
Dist. of Col. [2]	1	2	2	------	------	------	1	8	5	0	0	0
Virginia [2 4]	9	25	16	46	30	------	37	19	19	0	0	1
West Virginia [3]	0	5	5	1	4	7	5	3	3	1	0	1
North Carolina [2 4]	6	27	22	9	------	------	14	13	13	0	1	1
South Carolina [4]	4	11	8	110	121	54	7	1	5	2	1	0
Georgia [2 4]	2	20	10	5	------	------	6	6	0	0	1	0
Florida [4]	1	2	5	------	5	1	4	2	2	1	0	0
E. SO. CEN.												
Kentucky	3	14	11	4	2	------	27	0	14	1	1	2
Tennessee [2 4]	4	7	8	6	9	9	6	6	6	0	2	2
Alabama [4]	8	17	12	3	21	11	26	4	4	2	3	1
Mississippi [3]	0	13	12	------	------	------	------	0	------	1	1	1
W. SO. CEN.												
Arkansas	3	7	8	4	11	7	0	0	3	0	0	1
Louisiana [4]	3	2	9	3	7	7	0	4	4	0	0	0
Oklahoma	3	4	4	30	10	11	1	2	4	2	0	0
Texas [4]	15	16	24	151	23	39	52	7	33	2	3	3
MOUNTAIN												
Montana	0	0	1	3	------	------	8	17	8	0	0	0
Idaho	0	0	0	------	------	------	0	1	3	0	1	0
Wyoming	2	1	1	------	------	------	2	9	4	0	0	0
Colorado	4	13	7	6	4	------	4	8	8	0	0	1
New Mexico	0	0	1	------	------	------	9	0	1	0	0	0
Arizona	1	1	1	6	7	7	9	4	4	0	1	1
Utah [3]	0	0	0	------	------	------	12	6	6	0	0	0
PACIFIC												
Washington	2	3	0	------	------	------	4	97	20	0	0	0
Oregon	0	0	1	1	1	2	25	19	11	0	1	0
California [3 4]	10	19	17	17	4	5	62	113	99	0	2	3
Total	153	297	309	451	279	268	1,539	808	1,111	19	32	60
32 weeks	8,688	11,696	14,089	168,789	151,299	141,470	227,464	347,849	347,849	1,038	1,353	4,087

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 10, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Aug. 10, 1940	Aug. 12, 1939		Aug. 10, 1940	Aug. 12, 1939		Aug. 10, 1940	Aug. 12, 1939		Aug. 10, 1940	Aug. 12, 1939	
NEW ENG.												
Maine	1	0	0	1	2	4	0	0	0	1	3	3
New Hampshire	0	0	0	2	1	1	0	0	0	0	0	1
Vermont	0	1	1	3	1	0	0	0	0	0	1	1
Massachusetts	0	4	4	21	20	23	0	0	0	2	1	3
Rhode Island	0	1	1	0	0	3	0	0	0	0	2	2
Connecticut	2	3	3	4	3	6	0	0	0	3	3	1
MID. ATL.												
New York	4	11	11	65	71	76	0	0	0	16	10	25
New Jersey [2]	1	3	4	18	14	14	0	0	0	10	6	6
Pennsylvania	1	7	7	57	50	56	0	0	0	15	25	22
E. NO. CEN.												
Ohio [2]	16	9	4	33	61	61	0	1	0	8	16	16
Indiana	41	1	1	11	24	23	0	0	0	6	8	7
Illinois [2]	4	5	11	53	52	90	0	2	2	7	35	35
Michigan [3]	31	78	14	46	72	76	0	2	1	6	20	12
Wisconsin	0	3	2	35	30	31	1	0	1	0	1	2
W. NO. CEN.												
Minnesota	1	23	4	12	22	22	5	0	1	3	2	1
Iowa [3]	19	1	1	6	3	9	0	2	4	5	1	4
Missouri [3]	12	1	1	13	13	15	0	0	1	19	14	26
North Dakota	0	1	0	3	11	5	0	0	0	5	0	0
South Dakota	2	0	0	4	13	5	3	1	1	0	2	0
Nebraska	1	2	0	5	12	4	1	1	1	1	2	0
Kansas	26	6	2	16	24	24	0	1	1	5	4	8
SO. ATL.												
Delaware	0	0	0	0	0	1	0	0	0	0	2	1
Maryland [2 3]	1	0	1	10	16	10	0	0	0	3	12	14
Dist. of Col. [2]	0	0	1	1	5	4	0	0	0	2	2	2
Virginia [2 4]	5	2	2	9	8	8	0	0	0	8	23	35
West Virginia [3]	20	0	1	11	12	14	0	0	0	6	22	22
North Carolina [2 4]	2	7	6	16	32	25	1	0	0	3	13	22
South Carolina [4]	0	14	2	1	9	5	0	0	0	10	15	18
Georgia [2 4]	0	3	1	7	8	6	0	0	0	23	36	26
Florida [4]	0	2	2	4	2	2	0	0	0	4	5	2
E. SO. CEN.												
Kentucky	16	6	4	13	20	17	0	0	0	16	43	50
Tennessee [3 4]	3	0	1	7	14	8	0	1	0	11	35	35
Alabama [4]	1	2	2	4	15	8	0	0	0	14	12	18
Mississippi [3]	0	2	2	6	3	3	0	0	0	14	7	10
W. SO. CEN.												
Arkansas	1	0	0	6	8	6	0	0	0	30	20	23
Louisiana [4]	5	0	1	1	5	5	0	0	0	14	22	19
Oklahoma	5	2	1	4	4	8	1	0	0	19	15	44
Texas [4]	12	1	1	9	12	34	0	0	0	72	49	87
MOUNTAIN												
Montana	8	0	0	5	3	3	0	0	0	1	1	2
Idaho	0	0	0	2	0	3	0	0	0	0	2	1
Wyoming	1	0	0	3	0	2	0	1	0	1	1	1
Colorado	1	3	2	8	20	12	12	0	0	1	2	2
New Mexico	1	2	0	0	5	5	0	1	0	2	2	6
Arizona	0	4	0	0	2	1	0	0	0	0	1	1
Utah [3]	1	0	0	5	2	7	0	0	0	3	1	1
PACIFIC												
Washington	16	0	0	1	9	9	0	0	1	0	0	3
Oregon	2	0	0	6	7	7	0	0	0	0	3	3
California [2 4]	12	51	20	35	39	46	1	9	4	15	4	9
Total	275	261	261	582	759	865	25	22	33	384	506	634
32 weeks	1,670	1,805	1,805	118,285	115,792	164,040	1,952	8,632	7,914	4,592	6,602	7,543

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 10, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended Aug. 10, 1940	Whooping cough, Week ended Aug. 12, 1939
NEW ENG.		
Maine	38	15
New Hampshire	0	0
Vermont	14	12
Massachusetts	147	77
Rhode Island	1	12
Connecticut	25	57
MID. ATL.		
New York	343	391
New Jersey [2]	91	180
Pennsylvania	426	388
E. NO. CEN.		
Ohio [2]	243	257
Indiana	18	50
Illinois [2]	152	298
Michigan [3]	287	248
Wisconsin	83	190
W. NO. CEN.		
Minnesota	44	29
Iowa [2]	42	10
Missouri [2]	31	32
North Dakota	13	10
South Dakota	8	3
Nebraska	5	13
Kansas	50	14
SO. ATL.		
Delaware	6	7
Maryland [2 3]	118	57
Dist. of Col.[2]	6	45
Virginia [2 4]	36	99
West Virginia [3]	50	8
SO. ATL.—continued.		
North Carolina [2 4]	146	89
South Carolina [4]	21	35
Georgia [2 4]	20	8
Florida [4]	6	3
E. SO. CEN.		
Kentucky	58	43
Tennessee [2 4]	54	15
Alabama [4]	9	21
Mississippi [3]	-------	-------
W. SO. CEN.		
Arkansas	18	14
Louisiana [4]	27	43
Oklahoma	22	1
Texas [4]	223	58
MOUNTAIN		
Montana	2	10
Idaho	7	3
Wyoming	5	0
Colorado	9	22
New Mexico	8	9
Arizona	5	6
Utah [3]	55	84
PACIFIC		
Washington	40	13
Oregon	30	26
California [2 4]	260	91
Total	3,302	3,096
32 weeks	103,877	123,958

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Aug. 10, 1940, 32 cases as follows: New Jersey, 2; Ohio, 2; Illinois, 2; Iowa, 5; Missouri, 1; Maryland, 6; District of Columbia, 2; Virginia, 7; North Carolina, 1; Georgia, 2; Tennessee, 1; California, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Aug. 10, 1940, 58 cases as follows: Virginia, 1; North Carolina, 3; South Carolina, 3: Georgia, 21; Florida, 6; Tennessee, 1; Alabama, 11; Louisiana, 2; Texas, 8; California, 2.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 27, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	89	25	12	722	290	303	5	356	64	1,405	-------
Current week [1]	54	24	8	1,092	256	237	0	258	56	1,252	-------
Maine:											
Portland	0	------	0	3	1	0	0	0	0	4	19
New Hampshire:											
Concord	0	------	0	0	0	0	0	1	0	0	12
Manchester	0	------	0	0	0	3	0	0	0	0	8
Nashua	0	------	0	0	0	0	0	0	0	0	15
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	8
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	1	------	0	65	10	4	0	14	2	55	184
Fall River	0	------	0	12	1	2	0	0	0	6	27
Springfield	0	------	0	4	0	1	0	2	0	0	47
Worcester	0	------	0	75	4	2	0	1	0	6	42
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	16
Providence	0	------	0	19	3	1	0	1	0	5	57
Connecticut:											
Bridgeport	0	------	0	2	0	0	0	0	1	1	42
Hartford	0	------	0	1	1	1	0	0	0	1	43
New Haven	0	2	0	1	0	3	0	0	1	12	23
New York:											
Buffalo	0	------	0	5	3	5	0	4	0	12	120
New York	9	4	4	250	48	32	0	81	2	141	1,465
Rochester	0	------	0	2	1	0	0	1	0	4	78
Syracuse	0	------	0	1	2	2	0	0	0	9	44
New Jersey:											
Camden	0	------	0	6	0	0	0	0	0	0	22
Newark	0	------	0	79	2	5	0	9	0	26	87
Trenton	0	------	0	1	2	1	0	3	3	7	35
Pennsylvania:											
Philadelphia	2	1	1	116	6	19	0	15	1	35	456
Pittsburgh	1	------	0	1	6	6	0	8	1	33	150
Reading	0	------	0	0	0	0	0	3	0	31	23
Scranton	0	------	------	0	------	0	0	------	0	0	------
Ohio:											
Cincinnati	1	------	1	0	0	6	0	11	0	26	179
Cleveland	0	2	0	6	5	13	0	14	0	64	206
Columbus	0	------	0	0	2	2	0	4	0	35	107
Toledo	0	------	0	1	1	2	0	6	0	4	85
Indiana:											
Anderson	1	------	0	0	0	1	0	0	0	1	7
Fort Wayne	0	------	0	2	2	0	0	0	0	0	25
Indianapolis	1	------	0	2	5	2	0	4	1	3	118
Muncie	0	------	0	0	1	0	0	0	0	1	15
South Bend	0	------	0	0	0	0	0	0	0	0	13
Terre Haute	0	------	0	0	1	0	0	0	0	0	15
Illinois:											
Alton	0	------	0	0	0	1	0	0	0	0	14
Chicago	3	2	1	70	14	45	0	37	2	75	917
Elgin	0	------	0	2	1	0	0	0	0	4	12
Moline	0	------	0	0	0	0	0	0	0	0	12
Springfield	------	------	------	------	------	------	------	------	------	------	------
Michigan:											
Detroit	2	1	0	139	17	17	0	24	0	138	308
Flint	0	------	0	0	1	0	0	0	0	13	23
Grand Rapids	0	------	0	19	2	2	0	0	0	20	42
Wisconsin:											
Kenosha	0	------	0	4	0	0	0	0	0	0	8
Madison	0	------	0	5	0	1	0	0	0	10	23
Milwaukee	0	------	0	122	2	4	0	2	0	15	139
Racine	0	------	0	2	0	0	0	1	0	0	12
Superior	0	------	0	4	0	0	0	0	0	0	8

[1] Figures for Barre, Springfield, Ill., and Wichita estimated; reports not received.

City reports for week ended July 27, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	1	2	0	0	2	0	1	26
Minneapolis	0	------	0	1	3	3	0	0	0	14	128
St. Paul	0	------	0	2	4	1	0	0	0	15	75
Iowa:											
Cedar Rapids	0	------	------	1	------	0	0	------	0	2	------
Davenport	0	------	------	0	------	1	0	------	0	0	------
Des Moines	0	------	0	1	0	0	0	0	0	0	60
Sioux City	0	------	------	0	------	0	0	------	0	1	------
Waterloo	0	------	------	1	------	0	0	------	0	2	------
Missouri:											
Kansas City	2	------	0	2	1	2	0	3	0	4	87
St. Joseph	0	------	0	0	3	0	0	2	1	0	35
St. Louis	0	------	0	2	5	7	0	12	21	32	224
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	0	2	4
Grand Forks	0	------	------	0	------	1	0	------	0	2	------
Minot	0	------	0	0	0	0	1	0	0	1	18
South Dakota:											
Aberdeen	0	------	------	2	------	0	0	------	0	2	------
Sioux Falls	0	------	0	0	0	0	0	0	0	0	7
Nebraska:											
Lincoln	0	------	------	1	------	0	0	------	0	0	------
Omaha	0	------	0	2	3	1	0	1	0	1	68
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	1
Topeka	0	------	0	0	2	1	0	1	0	2	17
Wichita	------	------	------	------	------	------	------	------	------	------	------
Delaware:											
Wilmington	0	------	0	1	3	1	0	2	0	0	25
Maryland:											
Baltimore	1	------	0	1	8	3	0	9	1	126	236
Cumberland	0	------	0	0	0	0	0	0	0	0	14
Frederick	0	------	0	0	0	0	0	0	1	0	6
Dist. of Col.:											
Washington	2	------	0	2	13	4	0	19	0	17	224
Virginia:											
Lynchburg	3	------	0	0	0	0	0	0	0	0	9
Norfolk	0	------	0	1	1	2	0	0	0	1	27
Richmond	0	------	0	1	1	0	0	1	0	0	72
Roanoke	0	------	0	3	0	1	0	0	0	2	21
West Virginia:											
Charleston	1	1	0	0	0	0	0	0	0	0	10
Huntington	1	------	------	0	------	3	0	------	0	0	------
Wheeling	0	------	0	5	0	0	0	1	0	1	17
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	0	3	0	0	0	0	1	19
Wilmington	0	------	0	0	1	0	0	0	0	1	17
Winston-Salem	0	------	0	0	0	0	0	3	0	6	13
South Carolina:											
Charleston	0	1	0	0	3	1	0	2	0	0	28
Florence	0	------	0	0	1	0	0	1	2	0	5
Greenville	0	------	0	0	3	0	0	0	0	0	20
Georgia:											
Atlanta	2	------	0	0	2	1	0	3	0	2	79
Brunswick	0	------	0	0	0	1	0	0	0	0	4
Savannah	0	4	0	0	0	0	0	3	0	0	25
Florida:											
Miami	0	1	0	0	0	0	0	1	1	0	29
Tampa	0	------	0	0	1	0	0	1	0	0	20
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	0	0	8
Covington	0	------	0	1	0	0	0	0	0	0	17
Lexington	0	------	0	25	0	0	0	2	0	2	14
Louisville	0	------	0	1	3	3	0	2	0	30	65
Tennessee:											
Knoxville	0	------	0	7	0	0	0	0	0	0	29
Memphis	0	------	1	4	0	0	0	6	2	7	74
Nashville	1	------	0	0	3	1	0	0	3	32	44
Alabama:											
Birmingham	0	1	0	2	5	3	0	3	1	0	75
Mobile	0	------	0	0	0	2	0	0	0	3	29
Montgomery	0	------	------	0	------	0	0	------	0	0	------

City reports for week ended July 27, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0		0	0	5	0	0	1	0	6	
Louisiana:											
Lake Charles	1		0	0	2	0	0	0	2	2	9
New Orleans	0		0	1	14	2	0	11	2	4	176
Shreveport	0		0	0	1	3	0	0	0	0	46
Oklahoma:											
Oklahoma City	0	3	0	0	1	2	0	0	0	0	40
Tulsa	0		0	0	2	0	0	2	0	20	28
Texas:											
Dallas	1		0	6	0	1	0	1	2	7	72
Fort Worth	0		1	5	4	1	0	3	5	6	36
Galveston	0		0	0	1	0	0	0	0	0	18
Houston	4		0	0	2	0	0	4	5	6	87
San Antonio	1		0	0	3	1	0	2	1	14	75
Montana:											
Billings	0		0	0	1	0	0	0	0	0	16
Great Falls	0		0	4	1	0	0	1	0	0	12
Helena	0		0	0	0	0	0	0	0	0	4
Missoula	0		0	0	2	1	0	0	0	0	7
Idaho:											
Boise	0		0	1	0	0	0	0	0	0	2
Colorado:											
Colorado Springs	0		0	0	0	0	0	0	0	0	7
Denver	8		0	3	3	1	0	4	0	1	80
Pueblo	1		0	1	8	0	0	2	0	0	14
New Mexico:											
Albuquerque	0		0	1	1	0	0	0	1	1	12
Utah:											
Salt Lake City	0		0	12	0	1	0	0	0	84	22
Washington:											
Seattle	0		0	3	2	4	0	5	0	16	99
Spokane	0		0	0	0	3	0	0	0	0	28
Tacoma	0		0	0	1	1	0	2	1	2	25
Oregon:											
Portland	1		0	3	2	1	0	2	0	3	73
Salem	0			0		0	0		0	2	
California:											
Los Angeles	5	5	0	14	5	9	0	7	1	64	319
Sacramento	2		0	1	1	0	0	0	0	10	27
San Francisco	0		0	2	1	2	0	4	0	34	154

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
New York:			
New York	3	0	4
Ohio:			
Cleveland	0	0	5
Illinois:			
Alton	0	0	1
Chicago	1	0	0
Missouri:			
St. Joseph	1	0	0
District of Columbia:			
Washington	1	1	0
West Virginia:			
Huntington	0	0	3
Alabama:			
Birmingham	1	0	0
Louisiana:			
New Orleans	0	0	1
Shreveport	0	1	1
Oklahoma:			
Oklahoma City	3	0	0
Tulsa	0	0	1
Texas:			
Fort Worth	0	0	1
Houston	0	0	2
Montana:			
Missoula	0	0	1
New Mexico:			
Albuquerque	0	0	1
Washington:			
Seattle	0	0	3
Spokane	0	0	1
Tacoma	0	0	9
California:			
Los Angeles	0	0	2

Encephalitis, epidemic or lethargic.—Cases: Chicago, 1; Washington, D. C., 1; Sacramento, 3.
Pellagra.—Cases: Charleston, S. C., 1; Memphis, 1; Birmingham, 1; New Orleans, 1.
Typhus fever.—Cases: New York, 1; Savannah, 4; Miami, 2; Birmingham, 1; Montgomery, 1; New Orleans, 1; Fort Worth, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 6, 1940.—During the week ended July 6, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	5					6
Chickenpox		6	11	66	301	31	46	13	34	508
Diphtheria				14	2	3				19
Dysentery				11					2	13
Measles	1	29	4	41	116	76	193	13	38	511
Mumps				10	119	1	5		10	145
Pneumonia		5			19				3	27
Poliomyelitis				1	1					2
Scarlet fever		3	4	54	78	5		9	1	154
Tuberculosis	6	11	15	98	67	6	1			204
Typhoid and paratyphoid fever				7	8		2	2		19
Whooping cough		14	8	164	75	9	22	15	16	323

CUBA

Habana—Communicable diseases—4 weeks ended June 1, 1940.—During the 4 weeks ended June 1, 1940, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	9		Scarlet fever	2	
Malaria	2		Typhoid fever	55	8

PANAMA CANAL ZONE

Notifiable diseases—April–June 1940.—During the months of April, May, and June 1940, certain notifiable diseases, including imported cases, were reported in the Panama Canal Zone and terminal cities as follows:

Disease	April		May		June	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	10		7		4	
Diphtheria	8		9	1	8	1
Dysentery (amoebic)	1	1	8		3	1
Dysentery (bacillary)	5	2	5	1	4	
Leprosy			1		1	
Malaria	69	2	138	3	327	1
Measles	1		5			
Mumps			3		3	
Meningococcus meningitis	1					
Paratyphoid fever			4			
Pneumonia		25		20		18
Scarlet fever					1	
Trachoma			1			
Tuberculosis		25		38		25
Typhoid fever	2			1	1	
Typhus fever			1			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of July 26, 1940, pages 1367–1370. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

India—Karachi.—During the week ended July 20, 1940, 10 cases of cholera were reported in Karachi, India.

Plague

Argentina.—Plague has been reported in Argentina, by Provinces, as follows: May 1940—Cordoba, 3 cases; Jujuy, 1 case; Santiago del Estero, 8 cases, 1 death; Tucuman, 1 case, 1 death. June 1940—Cordoba, 18 cases, 16 deaths, including 11 fatal cases of pneumonic plague; Santiago del Estero, 10 cases, 1 death; Tucuman, 1 suspected case. Plague among rodents has also been reported in Santiago del Estero and Tucuman Provinces.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Mauka Camp.—Two rats found on July 9 and July 13, respectively, in Paauhau Mauka Camp in the vicinity of Paauhau, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

Peru.—During the month of May 1940, plague was reported in Peru, by Departments, as follows: Cajamarca, 6 cases; Lambayeque, 1 case; Libertad, 1 case, 1 death; Lima, 5 cases, 1 death; Tumbes, 10 cases, 2 deaths. There were also 21 unconfirmed suspected cases of plague reported in Tumbes Department.

Senegal—Tivaouane.—During the period June 20–30, 1940, 3 cases of plague were reported in Tivaouane, Senegal.

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Public Health Reports

VOLUME 55 AUGUST 23, 1940 NUMBER 34

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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DISABLING MORBIDITY, AND MORTALITY FROM CANCER AMONG THE MALE EMPLOYEES OF AN OIL REFINING COMPANY WITH REFERENCE TO AGE, SITE, AND DURATION, 1933–38, INCLUSIVE [1]

By WILLIAM M. GAFAFER, *Senior Statistician*, and ROSEDITH SITGREAVES, *United States Public Health Service*

The present report on morbidity and mortality from cancer based on the recorded experience of workers in oil refineries is offered principally because of the notable paucity of published morbidity data on cancer and because of the particular industry involved, one which, as is well known, has been not infrequently associated with the subject of cancer.

The basic data are made available by the records of the members of the sick benefit plan connected with an oil refining company, and cover the 6 years 1933–38. During this period a total of approximately 60,000 years of membership for male employees yielded, according to the records, 70 cases of cancer of which 46 ended in death. It is purposed to consider this morbidity and mortality with reference principally to age, site, and duration of disability for work.

While it is recognized that the actual number of cases available is small, yet it is believed that their analysis constitutes a contribution, limited to be sure, to the growing structure of a cancer epidemiology.

THE SICK BENEFIT ORGANIZATION

Since the basic data are derived from the records of a sick benefit organization, a review of the rules governing the organization is necessary. For purposes of sickness benefits, all employees are divided into two groups, salaried employees or those paid on a monthly basis, and wage earners, those paid on a weekly basis. There is no waiting period for the salaried group and the sickness benefits are full pay from

[1] From the Division of Industrial Hygiene, National Institute of Health. In connection with this paper the reader is referred to items *9* to *14* of the list of references.

It is planned to prepare a second report should further pertinent data become available. Reference is made particularly to occupational environment, and to the disposition of the cases not ending in death during the period of observation. It should be remembered that the period of observation is definitely limited to the 6 years 1933–38.

the first day of disability for periods ranging from 2 to 12 weeks and half pay thereafter for 2 to 40 weeks, depending upon service. For wage earners the waiting period is 3 days, after which these employees receive full pay followed by half pay, depending upon service, for the time periods given above. In the present paper both groups are placed upon a similar basis with respect to waiting period since only those cases lasting 8 calendar days or longer are considered. Furthermore, the length of service of the employees with cancer was such that no case was terminated artificially except after 52 weeks of benefits.

With respect to notification, certification, and verification of disability it may be noted that the organization requires that a case be reported immediately and that satisfactory evidence of physical disability for work be furnished the company physician. According to the medical department of the company, the company physician at each of the refineries follows lost-time cases very closely, making a consistent effort, among other things, to satisfy himself and the company medical department as to correct diagnoses.

ANALYSIS OF THE DATA

The 70 cases of cancer reported upon are those which ended during the 6 years 1933–38. These cases include 5 which began in 1932 and ended in 1933, but exclude 4 which began in 1938 and were carried over into 1939. In general, the cases which did not end in death terminated in recovery or sufficient improvement for return to work. In 5 cases, however, maximum benefits were received and records of the cases were thus terminated after 1 year of disability.

Comparison of mortality with other experiences.—The 46 deaths occurring among 58,991 male-years of membership in the sick benefit plan yield an average annual death rate of 0.78 per 1,000. The population exposed represents an age distribution ranging approximately from 15 to 69 years. The calculated crude death rate from cancer for white males aged 15 to 69 throughout the entire United States for the years 1933–37 is 0.96 per 1,000, while the experience of the industrial department of a large life insurance company (*1*) for 1935 yielded, among white males, the following death rates per 1,000 from all forms of cancer: All ages, 1–74 years, 0.86; ages 1–24, 0.04; ages 25–44, 0.26; and ages 45–74, 4.02. It is interesting to note in this connection that although previous studies (*2*, *3*) have indicated that certain types of mineral oils possess decided carcinogenic activity, the death rate in the present experience is not unfavorable.

The percentage distribution of deaths by site among the employees of the oil refining company and among white males, aged 15–69, in the United States is shown in the accompanying table:

Site	Percentage distribution of deaths from cancer		Number of deaths from cancer	
	Present experience	United States	Present experience	United States [1]
All sites	100.0	100.0	46	187,355
Digestive system	69 6	57.8	32	108,322
Respiratory system	10 9	9 4	5	17,586
Genitourinary system	8 7	15.0	4	28,146
Buccal cavity	6 5	6.1	3	11,314
Other	4.3	11.7	2	21,987

[1] References, *4–8.*

The employees of the oil refining company show relatively more cancers of the digestive system than occurred among the total population, while the proportion of cancers of the genitourinary system is somewhat less. With respect to the comparison shown for lesions of the digestive system it should be stated that most of the full-time company physicians are provided with X-ray equipment, a fact which, according to the medical department of the company, probably accounts for some of the difference between the two percentages.

Age distribution of cases, deaths, and membership.—The age distribution of the 70 cases of cancer and of the 46 deaths among these cases, based on the age of the individual at the onset of cancer, is shown in table 1. The table also shows the distribution of the membership by age as of January 1, 1938.

TABLE 1.—*Distribution by 10-year age groups of cancer cases and deaths, and of the exposed membership; experience of male employees of an oil refining company—1933–38, inclusive*

Age group in years	Percentage distribution			Number		
	Cases	Deaths	Membership	Cases	Deaths	Membership [1]
Total	100.0	100.0	100 0	70	46	11,010
Under 20			.8			84
20–29	1.4		18.4	1		2,023
30–39	4.3	6.5	26.6	3	3	2,927
40–49	32 9	30 4	31.1	23	14	3,429
50–59	48.6	54.4	18 9	34	25	2,078
60 and over	12.8	8.7	4 2	9	4	409

[1] Age as of Jan. 1, 1938. On the basis of continuous membership during the entire study period of 6 years this membership of 11,010 males on Jan. 1, 1938, would yield 66,060 male-years. Actually there were 58,991 male-years indicating that the average membership per male was approximately 5.4 instead of 6 years.

The table reveals that the distribution for the membership is strikingly different from those for cases and deaths. While the age distribution of membership suggests normality, the other two distributions are not only markedly skewed to the right on the age scale but they are very similar to each other. The percentage of cases and deaths in each of the first three age groups is consistently smaller than the corresponding percentage of membership. For the age group

40–49 years, the three percentages are similar in magnitude. In the next age group, however, the proportion of cases and deaths increases sharply to 48.6 and 54.4 percent, respectively, while the proportion of membership decreases to 18.9 percent. In the last age group, all three percentages decrease, but that for membership is still less than the other two.

The differences in the age distributions are emphasized when it is realized that over 75 percent of the membership was less than 50 years of age but only 39 percent of the cases and 37 percent of the deaths occurred among persons of these ages. Indeed, no cases of cancer were recorded for persons less than 20 years of age, and only one case occurred in the 20–29 year group. No deaths occurred until the group 30–39 years was reached. In spite of the fact that the percentages representing the age group 60 years and over seem to be relatively low for cases and deaths, respectively, the morbidity and mortality reported upon appear to have been experienced primarily in middle and later life.

TABLE 2.—*Distribution by site of frequency of, and mortality from, cancer according to broad age groups, experience of male employees of an oil refining company—1933–38, inclusive*

Site	All ages	Under 50 years	50 years and over	All ages	Under 50 years	50 years and over
	Annual number of cases per 1,000 males			Annual number of deaths per 1,000 males		
All sites	1.19	0.60	3.16	0.78	0.37	2.13
Stomach	.37	.13	1.18	.32	.13	.96
Other abdominal organs	.26	.13	.66	.22	.13	.51
Oral region	.22	.09	.66	.05		.22
Lungs	.14	.11	.22	.09	.05	.22
Trunk and extremities	.12	.07	.29	.05	.04	.07
Esophagus	.05	.02	.15	.05	.02	.15
General	.03	.05				
	Number of cases			Number of deaths		
All sites	70	27	43	46	17	29
Stomach	22	6	16	19	6	13
Other abdominal organs	15	6	9	13	6	7
Oral region	13	4	9	3		3
Lungs	8	5	3	5	2	3
Trunk and extremities	7	3	4	3	2	1
Esophagus	3	1	2	3	1	2
General	2	2				

NOTE.—Number of male-years of membership: Under 50 years of age, 45,304; 50 years of age and over, 13,627.

Frequency of cases and deaths by age group and site.—The average annual number of cases and deaths per 1,000 male employees is shown by site for all ages and for two broad age groups in table 2. The average annual case rate for all ages and sites is 1.19 per 1,000. The corresponding death rate is 0.78. These figures are equivalent to an annual incidence of 6 cases per 5,000 males, 4 of these 6 cases being fatal.

Among both cases and deaths, regardless of age, the stomach and other abdominal organs are the two leading sites of cancer. The frequency and mortality rates for these sites considered together are 0.63 and 0.54 per 1,000, or more than half of the respective total rates for all sites. The oral region with 0.22 cases per 1,000 ranks third in case frequency for all ages. The death rate (0.05 per 1,000), however, ranks fourth, sharing this position with cancers of the trunk and extremities, and the esophagus.

The data for the broad age groups as shown in table 2 are presented graphically in figure 1. The rates are shown in order of decreasing case frequency. Again the stomach and other abdominal organs are the two leading sites of cancer. In the younger group, the case and

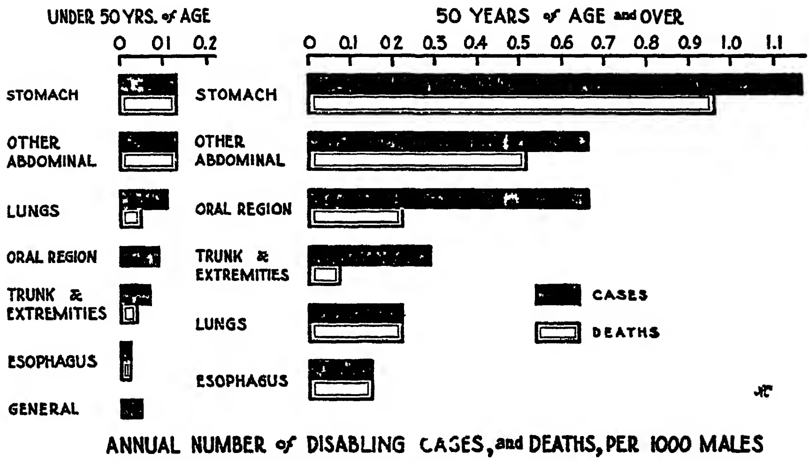

FIGURE 1.—Average annual number of disabling cases and deaths per 1,000 males from cancer, by site, for 2 broad age groups; experience of an oil refining company, 1933–38 inclusive.

death rates are equal and are the same for both sites (0.13 per 1,000). With increased age varying increases are shown in the four rates, the case and death rates for cancer of the stomach being definitely higher than the corresponding rates for other abdominal organs.

Certain changes with age may be noted in the ranking of the other sites. Cancer of the lung, although third in frequency among the males under 50 years of age, ranks fifth among the older group. The death rate in the former instance was less than half of the frequency rate, but the two rates were equal in the older group.

For cancer of the oral region the case frequency advanced with age from fourth to third place. Indeed, in the older age group the frequency of cancer of this site was equal to that for the "other abdominal organs," although the death rate for the former was less than half the latter. No deaths were recorded for cancer of the oral region in the younger group.

Of interest are the percentage changes in the rates with respect to age. In passing from the younger to the older age group both frequency and mortality rates, regardless of site, show an increase of over 400 percent. Increases are also shown for each specific site. The greatest change was recorded in the frequency of stomach cancer, which showed an increase of over 800 percent. The smallest increase, 100 percent, was shown for cancer of the lung; the death rate for this site, however, increased nearly 350 percent.

Number of cases per death.—The incidence of cancer may be expressed not only as the number of cases per 1,000 exposed population but also as the number of cases per death, an index which is particularly useful in describing morbidity and mortality relationships. This figure is the reciprocal of the fatality rate. The number of cases per death is shown by site and broad age group in the accompanying table:

Site	Number of cases per death		
	All ages	Under 50 years	50 years and over
All sites	1.52	1.59	1.48
General	(1)	(1)	(2)
Esophagus	1.60	1.00	1.00
Other abdominal organs	1.15	1.00	1.29
Stomach	1.16	1.00	1.23
Lungs	1.60	2.50	1.00
Trunk and extremities	2.33	1.50	4.00
Oral region	4.33	(3)	3.00

1 2 cases, no deaths.
2 No cases.
3 4 cases, no deaths.

NOTE.—The data upon which the ratios are based are shown in table 2.

The number of cases per death for all sites and ages is 1.52. In other words, on the average 3 cases yielded 2 deaths. The ratio shows little change with advancing age, moving as it does from 1.59 to 1.48, indicating a somewhat lower fatality rate for the younger age group.

The number of cases per death shows marked variation with site. Cancer of the oral region for all ages shows the lowest fatality with a ratio of 4.33 cases per death. The trunk and extremities rank second with 2.33 cases per death. Cancer of the lung records 1.60 cases per death; however, when the two broad age groups are examined, 2.50 cases per death occurred in the group under 50 years of age, while all three of the cases in the older age group ended fatally.

Duration of disability by site.—Tables 3 and 4 present information on the duration of disability from all cases and from the fatal cases and those not ending fatally. Table 3 reveals, among other things, that of the 13 cases of cancer of the oral region, 7 caused disability of less than 28 days, and none of these was fatal. One death was

recorded among the three cases lasting from 29 to 91 days. Both of the cases which lasted longer than 182 days ended in death.

TABLE 3.—*Distribution by site of the number of cancer cases and deaths according to duration of disability in calendar days; experience of male employees of an oil refining company—1933–38, inclusive*

Site	All durations		Duration of disability in calendar days—									
			8–28		29–91		92–182		183–364		365	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
All sites	70	46	12	3	20	16	21	19	9	8	5	-----
Stomach	22	19	1	1	9	9	10	8	1	1	1	-----
Other abdominal organs	15	13	2	2	4	3	5	5	3	3	1	-----
Oral region	13	3	[1] 7	-----	3	1	1	-----	2	2	-----	-----
Lungs	8	5	-----	-----	2	2	3	3	1	-----	2	-----
Trunk and extremities	7	3	[2] 2	-----	2	1	1	-----	2	2	-----	-----
Esophagus	3	3	-----	-----	-----	-----	3	3	-----	-----	-----	-----
General	2	-----	-----	-----	-----	-----	1	-----	-----	-----	1	-----

[1] 6 of the lip, 1 of the mouth. 4 recorded as excised.
[2] Inguinal region and scrotum, respectively.

TABLE 4.—*Average duration of disability, in calendar days, from cancer, by site, for all cases, cases ending fatally, and cases not ending fatally; experience of male employees of an oil refining company—1933–38, inclusive*

Site	Average duration of disability			Fatal and nonfatal		Fatal		Nonfatal	
	Fatal and non-fatal	Fatal	Non-fatal	Cases	Days	Cases	Days	Cases	Days
All sites	127.3	124.1	133.4	70	8,912	46	5,710	24	3,202
General	249.0	--------	249.0	2	498	--------	--------	2	498
Lungs	191.4	90.6	359.3	8	1,531	5	453	3	1,078
Trunk and extremities	152.7	263.0	70.0	7	1,069	3	789	4	280
Other abdominal organs	127.9	116.8	200.0	15	1,918	13	1,518	2	400
Esophagus	121.0	121.0	--------	3	363	3	363	--------	--------
Stomach	111.0	97.8	194.3	22	2,442	19	1,859	3	583
Oral region	83.9	249.0	36.3	13	1,091	3	728	10	363

A corresponding relationship is noted for cancer of the trunk and extremities. The cases of shorter duration did not, in general, terminate fatally. However, the 2 cases lasting longer than 182 days were both fatal.

The reverse situation is observed for cancer of the lung. The 5 deaths among the 8 cases recorded for this site all occurred during the interval of 29 to 182 days. Two of the remaining cases received maximum benefits and were terminated artificially after 365 days of disability; it is noteworthy that these cases lived a year after onset of disability, and that they account for 2 of the total of 5 cases for which maximum benefits were provided.

The observations in the preceding paragraphs are reaffirmed when the average duration of disability with respect to termination is considered for each site. The pertinent data are presented in table 4 and graphically in figure 2.

According to figure 2 the average durations, regardless of site, for all terminations, fatal and nonfatal cases, respectively, appear to be similar in magnitude. This does not hold when the specific sites are considered. The average duration of greatest magnitude for a specific site and regardless of termination is recorded for cancer

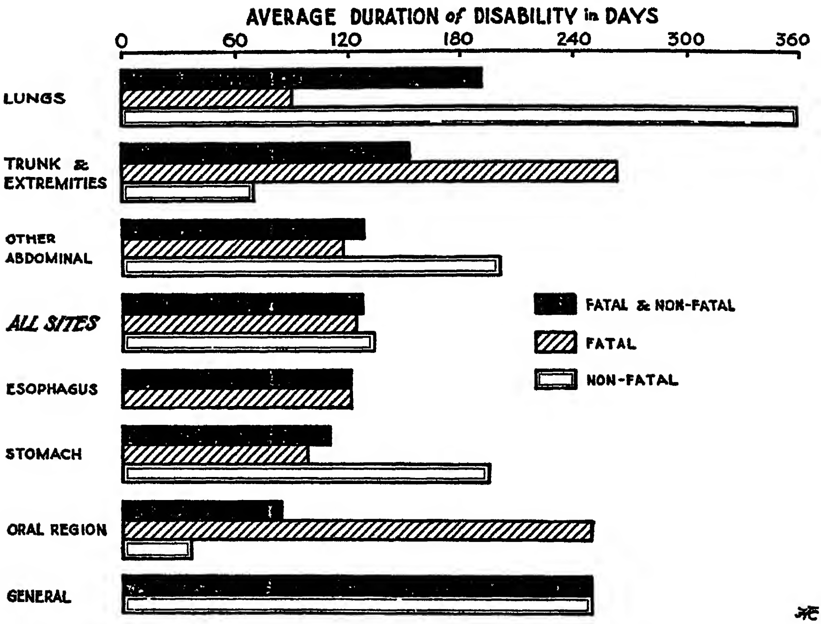

FIGURE 2.—Average duration of disability, in days, from cancer, by site, for all cases, cases ending fatally, and cases not ending fatally; experience of male employees of an oil refining company, 1933-38, inclusive. (Five cases received maximum benefits and were thus terminated after 365 days of disability; 2 of these cases were lung cancers. See text.)

of the lung. This site also ranks first with respect to average duration of nonfatal cases. Cancer of the trunk and extremities ranks second in average length of case for all terminations, but first with respect to average duration of the fatal cases. The shortest case duration regardless of termination is recorded for cancer of the oral region; this site also shows the shortest average duration for nonfatal cases.

For cancer of the stomach and other abdominal organs, sites which show high fatality, the nonfatal cases are somewhat longer, on the average, than the fatal ones.

If the average durations of the fatal and nonfatal cases, respectively, are arranged in order of decreasing magnitude by specific site, the

2 arrays present some interesting variations. The lungs come first in the array of nonfatal cases with an average case duration of 359.3 days. This site is last in the array of fatal cases with an average case duration of 90.6 days. The reverse holds for cancer of the trunk and extremities, and of the oral region. These are first and second in the arrangement of fatal cases with average durations of 263 and 249 days, respectively, and at the bottom of the array of nonfatal cases with average durations of 70 and 36.3 days.

SUMMARY

This paper analyzes the 70 cases of cancer recorded for the male members of the sick benefit plan of an oil refining company during the 6 years 1933–38. The exposure comprises approximately 60,000 years of life for male employees. There were 46 deaths. The analyses are concerned principally with site and duration of disability for work among workers of two broad age groups. Of interest are the following:

1. The exposure yielded a death rate of 0.78 per 1,000, and a frequency of 1.2 per 1,000.
2. Almost 70 percent of the deaths were related to the digestive system.
3. The two sites, stomach and other abdominal organs, accounted for more than half of the cases.
4. Each specific site showed increases with age with respect to both frequency and mortality.
5. For all ages the ratio of cases to deaths was less than 1.2 in three sites, the esophagus, stomach, and other abdominal organs.
6. Cancer of the lung showed the longest average case duration as well as the longest average duration of nonfatal cases.

REFERENCES

(*1*) Dublin, L. I., and Lotka, A. J.: Twenty-five Years of Health Progress. Metropolitan Life Insurance Company, New York (1937). P. 553.
(*2*) Heller, Imre: Occupational cancers. Jour. Ind. Hyg., **12**: 169–197 (1930).
(*3*) Twort, J. M., and Lyth, R.: The concentration of carcinogenic materials in mineral oils by distillation processes. J. Hyg., **39**: 161–169 (1939).
(*4*) U. S. Department of Commerce, Bureau of the Census: Mortality Statistics, 1933. 34th Annual Report. United States Government Printing Office (1936). Pp. 118–123.
(*5*) ————: Mortality Statistics, 1934. 35th Annual Report. United States Government Printing Office (1936). Pp. 168–173.
(*6*) ————: Mortality Statistics, 1935. 36th Annual Report. United States Government Printing Office (1937). Pp. 206–213.
(*7*) ————: Vital Statistics—Special Reports, **5**: 303–352 (1938). Pp. 310–317.
(*8*) ————: Vital Statistics—Special Reports, **7**: 591–640 (1939). Pp. 598–603.
(*9*) Editorial: Is cancer becoming more prevalent? J. Am. Med. Assoc., **103**: 113–114 (1934).

(10) Gover, Mary: Cancer mortality in the United States. I. Trend of recorded cancer mortality in the death registration States of 1900 from 1900 to 1935. Pub. Health Bull. No. 248. United States Government Printing Office (1939).
(11) Greenwood, M.: A review of recent statistical studies of cancer problems. Cancer Rev., **3**: 97–107 (1928).
(12) ————: Epidemics and Crowd-Diseases. Williams and Norgate, Ltd., London [1935]. Ch. 15, Cancer, pp. 361–378.
(13) Hunter, Arthur: Cancer—An analysis of life insurance experience. Trans. Act. Soc. Am., **40**: 394–411 (1939).
(14) Mountin, J. W., Dorn, H. F., and Boone, B. R.: The incidence of cancer in Atlanta, Ga., and surrounding counties. Pub. Health Rep., **54**: 1255–1273 (1939). (Reprint No. 2087.)

EXPERIMENTAL TRANSMISSION OF *TRYPANOSOMA CRUZI* INFECTION IN ANIMALS BY *TRIATOMA SANGUISUGA AMBIGUA*

By Ardzroony Packchanian, *Protozoologist, National Institute of Health, United States Public Health Service*

INTRODUCTION

Natural infection of *Triatoma gerstakeri*, *Triatoma heidemanni*, *Triatoma protracta*, and *Triatoma uhleri* with *Trypanosoma cruzi* have been reported as occurring in the United States (*2, 3, 10, 11*).

The present communication describes the experimental infection of *Triatoma sanguisuga ambigua* (Neiva, 1911) with *Trypanosoma cruzi*, and the transmission of infection by this insect to susceptible animals. The natural habitat and the epidemiological significance of this vector are also noted.

Triatoma sanguisuga ambigua was first described by Neiva (*8*) in 1911; he considered it as a variety of the well-known species of *Triatoma sanguisuga* (Le Conte, 1855) (*7, 12, 13*); *Triatoma pintoi* (Larrouse, 1926) (*6*) is synonymous with *T. s. ambigua* (*1, 4*).

FIELD STUDIES

Habits and biology.—During the summer of 1936 a field study was conducted in Florida by the writer. *Triatoma sanguisuga ambigua* [1] were found in a Civilian Conservation Corps camp at Sarasota, Fla.[2] This reduviid bug is popularly known as "blood sucker," "bed bug," "flying wood tick," "kissing bug," etc. Examination of collections of dead insects in various museums and schools in Florida revealed that occasional specimens have been taken from several other towns and cities of Florida, namely, St. Petersburg, Bee Ridge, Lake Hamilton, Palmetto, Thonotossassa, Inverness, and Orlando.

[1] The insects were identified by Mr. H. G. Barber of the U. S. Department of Agriculture, Washington, D. C.

[2] The writer is indebted to Dr. A. L. Matthews and his co-workers at Sarasota, Fla., for their aid during the field study.

At Sarasota, Fla., *Triatoma sanguisuga ambigua* were found to feed on tree toads of the genus *Hyla* which frequent palmetto trees.[3]

Near the Miakka River, the cabbage palmetto (*Sabal palmetto*) is from 12 to 40 feet high, with a trunk diameter of 2 feet or less. It is found growing in marshes, on hummocks, and in sandy soil throughout most sections of Florida and other southern States (*5*). The trunk is covered with old "boots" remaining from decayed leaf-stalks. As the trees grow older, the lower decayed leaf-stalks fall away, leaving a fairly smooth, slightly ridged stem. Tree toads and cockroaches and other insects live under the leaf-stalks of palmetto trees, and among them nymphs and adults of *T. sanguisuga ambigua* were found in various stages of development (see figs. 1 and 2). Three adults among 97 nymphs were found on palmetto trees on August 10, 1936. In the nymphal stage, *Triatoma* cannot fly and prefer to stay in or near nests of animals where there is usually a supply of blood available, and where the bugs are protected from heavy rainfall. Specimens of *Triatoma* were found under these conditions in the palmetto trees in Sarasota, Fla.

Several hundred palmetto trees were examined in Miami, Tampa, Tallahassee, Pensacola, and Jacksonville, Fla., and in Savannah, Ga., and no *T. s. ambigua* were found. The absence of this reduviid bug was possibly correlated with the absence of tree toads in and around these trees.

Over 50 persons in Civilian Conservation Corps camps were bitten by these bugs during the summer of 1936. The victims were, in most cases, young colored men. The bites are generally painless, no notice being taken of them at the time of the bite. However, a few hours later a moderate erythema about 3 to 4 mm. in diameter is found. This is followed by itching. in about 12 hours a definite macule develops, and at the end of 48 hours there is a definite papule with inflammation which remains for about 3 days, causing varying degrees of pain and itching.

Samples of blood obtained from 10 persons who developed the above symptoms after being bitten by the bugs were defibrinated, and mice, guinea pigs, and blood agar slants were inoculated with these samples to ascertain the possibility of *Trypanosoma cruzi* infection. Results were negative.

EXPERIMENTAL FINDINGS

Examination of Triatoma sanguisuga ambigua for natural infection with microorganisms.—The fecal material from 300 live specimens of the bugs (all collected at Sarasota, Fla.) examined microscopically in

[3] A large percentage of the tree toads was found to be naturally infected with *Haemogregarina*, but no *Trypanosoma rotatorium* were found in the blood of tree toads from this location.

cover-glass preparations was invariably negative for trypanosomes.[4] The material from the guts of about 10 percent of the bugs was infected with *Emeria*.

The examination of the saliva of 25 insects showed a short, non-motile rod, but no flagellates were seen.

Rearing Triatoma sanguisuga ambigua.—Under laboratory conditions older specimens fed readily on a variety of animals, namely, mice, rats, guinea pigs, rabbits, English sparrows, and frogs Newly hatched bugs were somewhat more particular and fed only on delicate skin and easily accessible blood vessels, such as occur in small frogs and in the tails of mice. After the first meal on frogs or mice, the young nymphs will then feed on other species of animals and man The bug takes blood by its proboscis (see fig. 1), and after a full meal excretes fecal material on or about the site of the bite.

Experimental infection of Triatoma sanguisuga ambigua with Trypanosoma cruzi.—Twenty-four adult *T. s. ambigua* collected in Florida, apparently free from *Trypanosoma cruzi* infection, and 61 noninfected specimens reared in the laboratory (both nymphs and adult males and females) were fed on guinea pigs infected with *Tr. cruzi.* All the bugs became infected with *Tr. cruzi.*

The fecal excretions of these bugs were obtained by slight pressure with forceps over the abdomens of the insects, and were examined microscopically in cover-glass preparations for evidence of trypanosomes (objectives 21× and 45×, ocular 10×). Small droplets of saliva were obtained from the proboscis of the insects by exerting slight pressure over the thorax. These droplets were likewise examined microscopically and occasionally inoculated into mice and guinea pigs.

The following descriptions of two experiments are, as a whole, representative of findings of six similar groups. Because of the uniformity of the results, the remaining four experiments will not be described.

Experiment 5.—Ten adult (male and female) *T. s. ambigua* collected near Miakka River, Fla., were examined in Washington, D. C. The fecal excretions and saliva were found to be free from flagellates in three consecutive examinations, 10 days apart. These bugs were then permitted to feed for about 30 minutes on the hair-clipped skin of a young guinea pig experimentally infected with a known strain of *Tr. cruzi.* While the bugs were feeding on the infected guinea pig, direct microscopic examination of the guinea pig's ear blood showed 1 trypanosome per 10 microscopic fields (objective 45×, ocular 10×). These reduviid bugs were allowed to feed on the same infected guinea pig 4, 5, 6, 14, 15, and 17 days after the first feeding, each meal time lasting about 15 minutes. The fecal excretions and saliva of these

[4] At the present time, there is no known reservoir host of *Trypanosoma cruzi* in Sarasota, Fla, from which *Triatoma sanguisuga ambigua* may acquire the infection

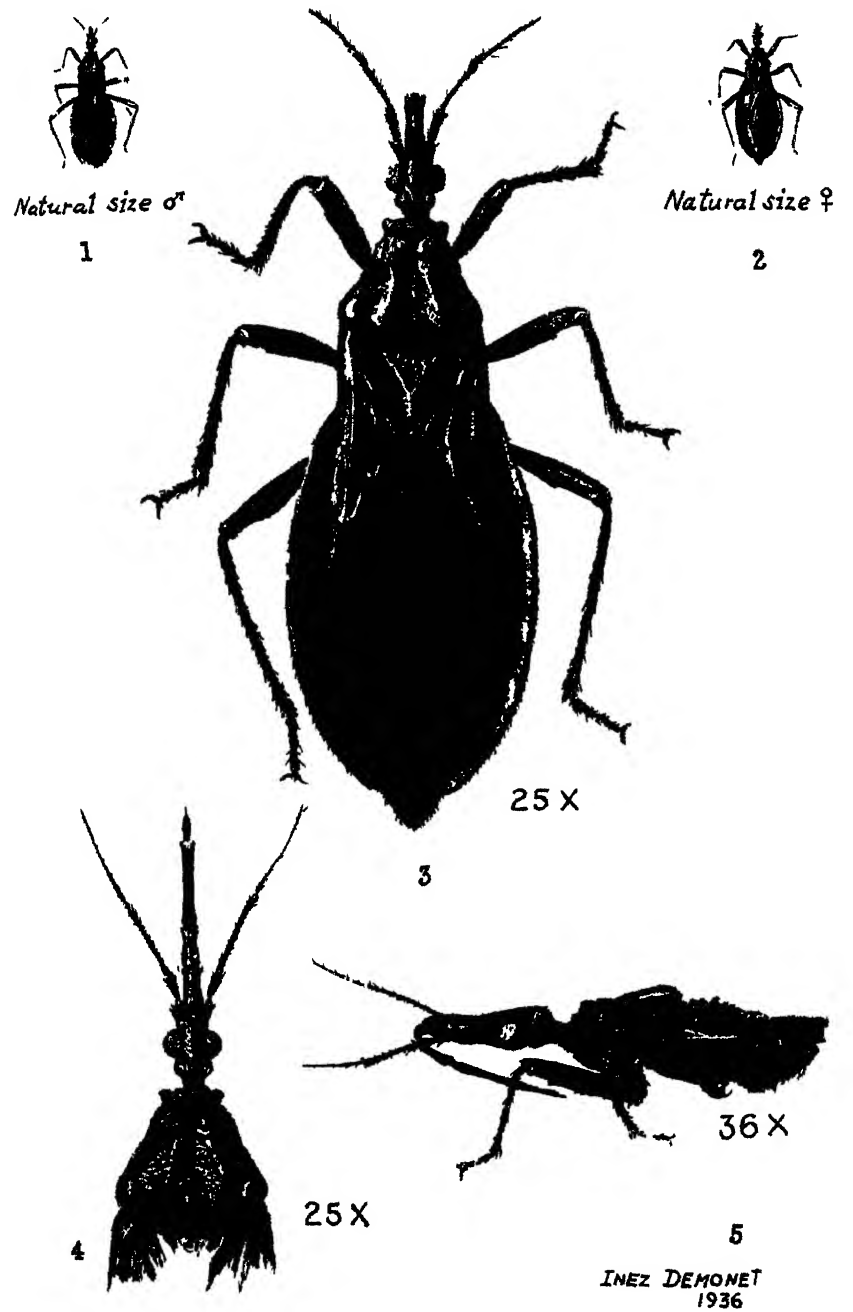

FIGURE 1.—*Triatoma sanguisuga ambigua* (photographed from colored drawing) 1. Adult male, 2, adult female 3, dorsal view of an adult female enlarged about 25 times, 4, dorsal view of the head, showing extended proboscis ready to feed, 5, side view of head, showing proboscis bent.

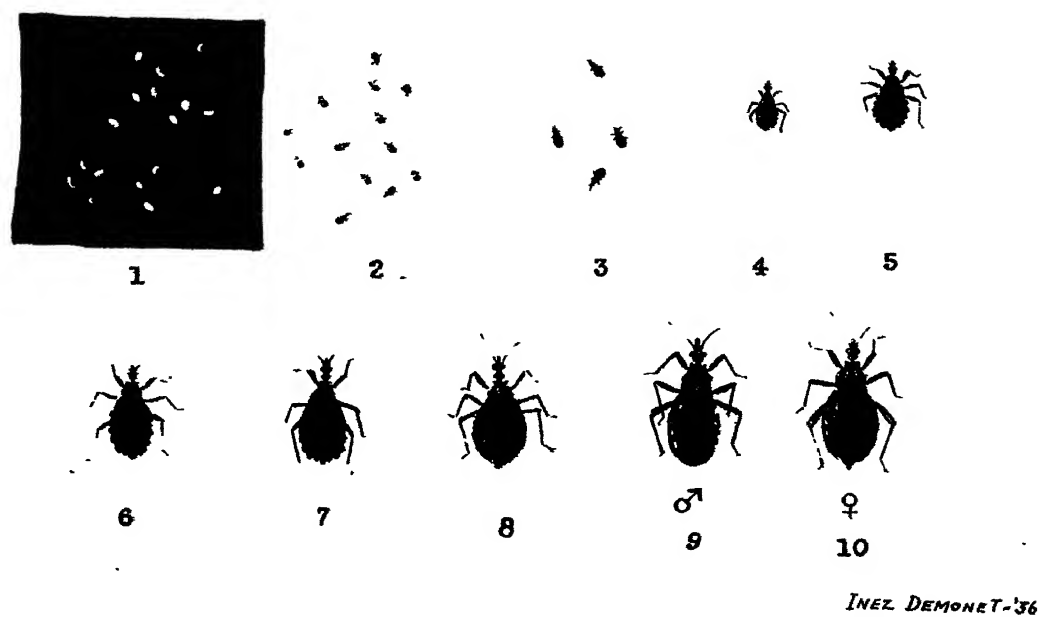

FIGURE 2.—*Triatoma sanguisuga ambigua*, natural size (photographed from colored drawing). 1. Eggs; 2, young nymphs, 1 to 4 days old, 3, 7-day-old nymph after first meal of blood; 4, 5, 6, 7, 8, large nymphs; 9, adult male; 10, adult female.

insects examined microscopically 18 days after their first meal and 1 day after the last infected meal were found to be swarming with trypanosomes. The flagellates were chiefly crithidia and a few metacyclic trypanosome forms. The saliva, on the other hand, was free from flagellates. One of the insects was crushed and its intestinal content inoculated into 2 mice and 2 guinea pigs; all of these animals developed trypanosomiasis as determined by direct microscopic examination of their blood at various intervals and by culturing trypanosomes from their blood on N. N. medium (*10*).

Experiment 7.—Two adult females and 2 nymphs of *Triatoma sanguisuga ambigua* free from infection were fed about 1 hour on a guinea pig which was experimentally infected with *Trypanosoma cruzi*. The fecal excretions of these blood-sucking insects were examined 18 days after the first infected meal and many flagellates in the forms of crithidia and metacyclic trypanosomes were found.

Both groups of experimentally infected *Triatoma sanguisuga ambigua* maintained *Tr. cruzi* infection in their intestines throughout life. The eggs from experimentally infected bugs were free from trypanosomes, and nymphs hatching from these eggs, after feeding on normal, healthy animals, showed no evidence of trypanosome infections.

MANNER OF TRANSMISSION OF *TRYPANOSOMA CRUZI* INFECTION TO SUSCEPTIBLE ANIMALS BY *TRIATOMA SANGUISUGA AMBIGUA*

Noninfectivity of the bite of Triatoma infected with Trypanosoma cruzi.—Three *Triatoma sanguisuga ambigua* experimentally infected with *Trypanosoma cruzi* were allowed to feed through gauze from a tumbler on hair-clipped skin of a young guinea pig on September 16, 18, 19, 21, and 23, 1936. By placing folded filter paper in the tumblers with the insects and immediately removing the insects after feeding, before they began to excrete fecal material, it was possible to insure that no feces came in contact with the skin. The ear blood of the guinea pig was examined microscopically 8, 9, 13, 16, 18, 19, 22, 24, 25, 26, 30, 35, 39, and 47 days following the first meal of the insects for evidence of trypanosomiasis. The results were negative. Sixty-five days following the last microscopic blood examination, the guinea pig was etherized, its heart blood introduced into N. N. tubes, and the organs fixed in 10 percent formalin. There was no growth of trypanosomes in the N. N. tubes during 2 months of observation, and microscopic study revealed no leishmania-like forms of *Tr. cruzi* in the section.

Infectivity of fecal excretion of Triatoma containing Trypanosoma cruzi.—Seventeen *Triatoma sanguisuga ambigua* (adults and nymphs) experimentally infected with *Trypanosoma cruzi* were permitted to

feed on the hair-clipped skin of 2 normal guinea pigs. The skin of the animals bore no macroscopic abrasions. The insects were applied directly to the skin and were confined to an area of about 2 inches. Their escape was prevented by a circular chamber, the top of which consisted of a mica cover having a few small holes. These holes were made to prevent the accumulation of excessive moisture in the chamber and for manipulation of the insects. The insects were confined in this chamber for 3 hours. They deposited fecal matter on the skin of the animals freely, usually near the site of a bite. The fecal droplets varied in size and color. It usually required from 15 to 30 minutes before the droplets dried on the skin of the animals. At the end of 10 minutes some of these droplets were examined microscopically and were found to be swarming with trypanosomes. At the end of 3 hours the insects were removed and placed in tumblers, while the guinea pigs were placed in cages. The ear and heart blood of the guinea pigs was examined at various intervals for evidence of trypanosomiasis. Both guinea pigs contracted the *Tr. cruzi* infection. One of these experiments will be described below.

Experiment 171.—On October 16, 1936, 1 adult and 1 nymph of *T. s. ambigua*, experimentally infected with *Tr. cruzi*, were placed in a feeding chamber in direct contact with the skin of a normal, healthy guinea pig. The nymph, after feeding, excreted one drop of coffee-colored fecal excretion on the skin of the guinea pig (back). This droplet was left to dry. The next day a few more infected *Triatoma* were fed on the same guinea pig, and the fecal excretions of these infected bugs were likewise deposited on the skin of the guinea pig.

The ear blood of this guinea pig was examined microscopically for evidence of trypanosomes 2, 5, 16, 24, and 33 days following the beginning of the experiment, with negative results. However, the microscopic examination of the blood of this guinea pig 35 days following the beginning of the experiment showed 1 trypanosome per 5 microscopic fields. The movements of the trypanosomes as seen under the microscope were zig-zag in motion, one of the characteristics of *Tr. cruzi* in a vertebrate host. The next microscopic examination of the guinea pig 7 days later also showed trypanosomes. At this time there was 1 trypanosome per about 10 microscopic fields. A few drops of heart blood of this guinea pig were inoculated into N. N. tubes which gave a rich growth of trypanosomes (*9*).

SUMMARY

1. *Triatoma sanguisuga ambigua* is widely distributed in Florida.

2. *T. s. ambigua* in Sarasota, Fla., feed on tree toads, genus *Hyla*, and have colonized in "boots" of palmetto trees.

3. During 1936–37 about 300 live *T. s. ambigua* collected in Sarasota, Fla., were examined and found to be free from *Trypanosoma cruzi* infection. A few *Triatoma* contained *Emeria* in their intestines, while many had a nonmotile bacteria in their saliva. The tree toads found on palmetto trees were free from *Trypanosoma rotatorium*, but most of them were infected with *Haemogregorina*.

4. Over 50 persons bitten by these insects in Civilian Conservation Corps camps during 1936–37 manifested various allergic symptoms and occasionally a small abscess. However, there was no indication of human trypanosomiasis as determined by cultural and animal inoculation tests of 10 persons who were bitten.

5. Eighty-five *T. s. ambigua* have been experimentally infected with *Trypanosoma cruzi* by permitting nymphs and adults (males and females) to feed on infected guinea pigs.

6. The eggs of infected *Triatoma* are free from *Tr. cruzi*, and newly hatched nymphs remained free from infection throughout their lives when fed on healthy animals.

7. The infection was not transmitted to 8 guinea pigs by the bite of 24 infected *Triatoma* when care was taken that no fecal material of the insects came in contact with the skin of the animals during feeding.

8. *T. s. ambigua* experimentally infected with *Trypanosoma cruzi* produced trypanosomiasis in healthy, normal guinea pigs when allowed to feed and then deposit fecal excretion on the hair-clipped skin of the guinea pigs. The scanty number of trypanosomes was demonstrated microscopically in the circulating blood of these guinea pigs and recultured successfully on N. N. media.

REFERENCES

(*1*) DeGeer, C.: Mémoires pour servir à l'histoire des insects. Vol. 3, Stockholm (1778).

(*2*) Kofoid, C. A., and McCulloch, I.: On *Trypanosoma triatomae*, a new flagellate from a hemipteran but from the nest of wood rat *Neotoma fuscipes*. Univ. Calif. Public Zool., **16:** 113 (1916).

(*3*) Kofoid, C. A., and Whitaker, B. C.: Natural infection of American human trypanosomiasis in two species of cone-nosed bugs, *Triatoma protracta* Uhler and *Triatoma uhleri* Neiva, in the western United States. J. Parasitol., **22:** 259 (1936).

(*4*) Hussey, R. F.: A bibliographical notice on the reduviid genus *Triatoma* (Hemip.). Psyche, **29:** 109 (1922).

(*5*) Mowry, H.: Native and exotic palms of Florida. Florida Agric. Exper. Station Bull., **84:** 1 (1936).

(*6*) Larrouse, F.: Description de deux espèces nouvelles du genre *Triatoma: T. carrioni* n. sp. et *T. pintoni* n. sp. Ann. de Parasitol., **4:** 136 (1926).

(*7*) LeConte, J.: Remarks on two species of American Cimex. Acad. Nat. Sc. Philadelphia, **7:** 404 (1855).

(*8*) Neiva, A., and Lent, H.: Notas e commentairios sobre triadomideos. Lista de especies e sua distribuição geographica. Rev. de Entomol., **6:** 153 [illegible]

(*9*) Packchanian, A.: On the cultivation of seven species of trypanosomes *in vitro*. Science, **80:** 407 (1934).

(*10*) Packchanian, A.: Natural infection of *Triatoma gerstakeri* with *Trypanosoma cruzi* in Texas. Pub. Health Rep., **54:** 1547 (1939).

(11) Packchanian, A.: Natural infection of *Triatoma heidemanni* with *Trypanosoma cruzi* in Texas. Pub. Health Rep., **55**: 1300 (1940).
(12) Stål, C.: Monographie des Gattung Conorhinus und Verwondten. Berlin Entomol. Ztschr., **3**: 99 (1859).
(13) Stål, C.: Enumeratio Hemipterorum. Vol. 2, pp. 1–159, P. A. Norstedt f. Soner, Stockholm (1872).

BRIEF SUMMARY OF THE PRINCIPAL FEATURES OF WORKMEN'S COMPENSATION LAWS IN THE UNITED STATES

In view of the increasing social consciousness of Government as evidenced by Federal and State legislation in recent years, the trend and principal features of workmen's compensation laws in the United States are of especial interest to health and welfare agencies. This is true not only with respect to medical care, compensation during the period of disability, and death benefits; but the recognized responsibility of industry for injuries sustained by employees in the course of their employment, regardless of the question of negligence, is a stimulation to industry to make adequate provision for the health and protection of employees.

In addition to the exclusion of the principle involving negligence in the application of workmen's compensation acts, another important protective feature, an advance made since the first of these laws was passed, is the inclusion of occupational diseases as compensable conditions. Early in the history of compensation legislation none of the acts expressly provided for the payment of benefits for disability occasioned by occupational disease, although in some States, without specific provision in the law, occupational diseases have been included by the interpretation of the courts. The number of States making these diseases specifically compensable has been gradually increasing.

Workmen's compensation legislation in the United States is of comparatively recent history, dating from 1911. The first of these laws were enacted by the States of Washington and Kansas on March 14 of that year. The Washington law became effective on October 1, 1911, while the Kansas law went into effect on January 1, 1912. Nine other States enacted workmen's compensation laws in 1911, which became effective either in that year or in 1912. The United States Employees' Compensation Act was approved September 7, 1916, and the Longshoremen's and Harbor Workers' Compensation Act on March 4, 1927.

The principal features of workmen's compensation laws in the United States, its territories, and the District of Columbia are presented in a recent publication of the Bureau of Labor Statistics of the United States Department of Labor.[1]

[1] Principal Features of Workmen's Compensation Laws, as of January 1, 1940. By Charles F. Sharkey. Monthly Labor Review, March 1940. (Reprinted as Serial No. R. 1090.)

On January 1, 1940, compensation laws were in effect in all of the States except two, Arkansas and Mississippi. The Legislature of Arkansas adopted such a law in 1939, but the effective date has not yet been determined, pending the outcome of a referendum vote in November of 1940. The principal provisions of this law, however, are included in the following brief analysis of Mr. Sharkey's summary. In addition to these States, workmen's compensation laws are operative in the District of Columbia, Puerto Rico, Alaska, Hawaii, and the Philippine Islands, for civil employees of the Federal Government and for harbor workers and longshoremen under the Federal Longshoremen's Act.

There are now in operation in the United States and territorial possessions no less than 54 independent compensation laws which have been drafted and put into effect over a period of 30 years. While all agree in their main objective—the payment of benefits to injured employees or to the dependents of those killed in industry, without regard to the question of negligence—there is a great diversity in the details of application of this fundamental principle. This applies not only to the scope of the laws and the amount of compensation payable under them, but also to compulsory and voluntary features, the securing or not securing of the payment of benefits, the manner of securing such payments where required, the methods of administration, and the question of election or rejection of the act.

In this summary, all workmen's compensation laws in effect in the United States and its territorial possessions are included. As used here, the words "laws" and "acts" are all-inclusive, while the words "State" and "States" refer to the continental political jurisdictions so designated.

Insurance.—The financing of the payment of benefits is provided through insurance with private companies, in a governmental fund, or employer self-insurance, except in the case of the civil employees of the Federal Government, where the payments are made from congressional appropriations. Of the 54 acts, 22 are compulsory and 32 are elective, with some exceptions and variations regarding public employees, contractors on public works, and hazardous employments. Governmental insurance systems exist in 18 States and Puerto Rico, of which 8 (including Puerto Rico) are monopolistic while 11 operate on a competitive basis. Under the other acts insurance is either in private companies or by self-insurance.

Coverage.—The compensation laws do not attempt to cover all employments. Certain employees are specifically excluded by the various acts, and some laws apply only to persons engaged in hazardous employments. Casual employees are usually excluded, and generally the laws do not apply to persons engaged in agriculture and domestic

service. Most of the acts cover minors, and 13 of the State statutes provide extra compensation in the case of injury to minors employed illegally.

In 27 States and Puerto Rico, employers of less than a stipulated number of employees are exempt, but the laws usually permit voluntary election for exempt employments. The exemption number of employees ranges between 2 in Oklahoma and 16 in Alabama.

The compensation laws in 9 States apply only to hazardous employments, with permission in all but 2 of these States for employers and employees in other occupations to come under the act. In 3 of these 9 States the laws are elective in nature, while in the others they are compulsory.

Employees of the political division and its subdivisions and of municipalities are included in 31 of the compensation acts, under some of which compensation is compulsory for public employees while elective as to private employments.

Persons engaged in interstate commerce and civil employees of the United States Government are not included in the State laws. Interstate commerce comes under the jurisdiction of the Federal Government. The United States Employees' Compensation Act applies to all Federal civil employees and employees of the government of the District of Columbia, while the Longshoremen's and Harbor Workers' Compensation Act provides compensation benefits for employees in private enterprise while engaged in maritime employment upon the navigable waters of the United States.

Occupational diseases.—Of especial interest to public health workers, particularly to industrial hygienists, are the provisions relating to occupational diseases.

As originally enacted, none of the workmen's compensation acts provided expressly for the payment of benefits for disability resulting from an occupational disease. It has come to be recognized, however, that it is just as important for workmen to be protected from these diseases as from accidental injury.

Some of the compensation acts list the specific occupational diseases which are compensable, while others provide compensation for any disability resulting from an occupational disease. In a few instances the workmen's compensation act uses the word "injury" instead of the word "accident." These laws provide many cases for adjudication. In some cases the courts have had to determine whether or not a disability was due to an occupational disease; in others they have construed a law to mean that any injury resulting from an occupational disease is compensable.

In 30 instances the laws provide for compensation for all occupational diseases or for certain specified diseases.

Election.—In 23 of the 32 laws which are elective, election is presumed in the absence of positive rejection, this presumption affecting both the employer and the employee. In the others, the employer must take positive action; but, if he acts, the employee's acceptance is presumed, except in 1 State, where the employee must sign an acceptance. In 1 State the law is compulsory as to the employer, but the employee may elect not to be covered.

Extraterritorial application.—The compensation acts vary as to extraterritorial application. About two-thirds of the laws are applicable to accidents happening outside the jurisdiction. Generally, the contract of hire must have been made within the jurisdiction and either the employee must be a resident therein or the employer's place of business must be within such jurisdiction. Where the law does not specifically cover this point, the courts in some instances have construed it as having extraterritorial application.

Suits for damages at common law.—Where both parties have accepted the act, suits for damages are generally forbidden, but in one State (New Hampshire, an elective State) the employee may choose either to proceed under the compensation act or sue for damages at common law. In most of the acts having an elective provision, if the employer has accepted the act, an employee who has rejected it may sue, but in such cases the employer retains the common-law defenses.

Under 38 compensation acts, the employee may sue for damages, with the common-law defenses removed, upon failure of the employer to secure payment of compensation or to provide the insurance required by the act, or to pay the premiums. In 9 States, if there is "intent" on the part of the employer to injure, or if injury is due to his gross negligence or wilful misconduct, the employee may bring suit. In 15 instances no suits are permitted after both the employer and employee have accepted the provisions of the compensation act.

Waiting period.—All of the compensation acts except the Oregon law provide a "waiting" period immediately following injury during which time compensation shall not be paid. This period ranges from a minimum of 1 day to a maximum of 14 days, the majority of the States requiring a 7-day waiting period.

This waiting period has no relation to the requirement that medical and hospital care shall be provided, as the employee is entitled to these benefits immediately. In most of the States the payment of compensation is retroactive if the disability continues for a specified number of days or weeks.

Second injuries.—All but 8 of the compensation laws provide specifically for payment of compensation in second-injury cases. These laws are designed to cover cases in which an employee suffers the loss of a member of the body in an accident and subsequently loses

another in a second accident through which he may become permanently and totally disabled. About half of these laws provide for the apportionment of compensation according to the disability resulting from the injury, the last employer paying only the amount attributable to the second injury. The others provide that in determining compensation for the second injury the decreased earning power as the result of the first injury shall be used as a basis in rendering the award. In 12 States, the District of Columbia, Hawaii, and under the Federal Longshoremen's Act, "second-injury funds" have been established, and in case of a second accident the employer must pay only for the second injury. While the employee is compensated for the disability resulting from the combined injuries, the remainder of the award is paid from the second-injury fund. The method of financing the fund varies.

Scale of compensation.—The amounts payable under the various compensation acts are determined by three factors, namely, the rate (usually a percentage of the wages), the term or period of payment, and in most instances a maximum or weekly total payment. The amount and method of payment also differ according to the type of injury. The acts prescribe certain payments in case of death, permanent total disability, temporary total disability, and permanent partial disability. There is an apparent tendency to recognize a greater economic loss in case of permanent total disability than in case of death.

Medical benefits.—Under all of the compensation laws medical aid is required to be furnished to injured employees, usually in addition to compensation payments. Some laws allow additional amounts for hospital expenses. Seventeen acts (including U. S. Civil Employees' and Longshoremen's Acts) limit neither the amount of, nor the time during which, medical benefits are rendered; 12 limit the amount but not the time; 12 limit the time but not the amount; and 13 impose a restriction on both time and amount. Medical benefits are without cost to the workmen in the great majority of cases.

Artificial limbs and other appliances.—In some instances artificial limbs and other appliances are furnished under the compensation laws. In 21 States, under the Federal Longshoremen's Act, and the compensation act covering Federal civil employees and employees of the District of Columbia, the law requires the furnishing of artificial limbs, and in 2 other States the Compensation Commission is authorized to supply them. In 1937 the Pennsylvania law provided for supplying artificial limbs, but this provision was repealed in 1939.[3]

Administration and settlement of claims.—Workmen's compensation laws are administered either by an administrative commission (or board) or by the courts. When administration is left to the courts

[3] Information furnished by Division of Labor Law Information, Bureau of Labor Statistics

it is usually because no other machinery for administration has been created, and this law, as in the case of other laws, is enforced in the various Federal, State, and county courts. In States where the law is administered by a commission or board, appeals to the courts are usually limited to questions of law, the determination of facts being left to the jurisdiction of the commission or board.

Accident reporting and prevention.—In only 25 instances do the workmen's compensation acts require reports to be made of all industrial accidents. The laws vary with respect to the minimum period of disability for which reporting is required, 13 requiring reports of accidents which cause disability for 1 day or more.

Most industrial States have inspection agencies which are charged with duties in connection with the prevention of accidents, chiefly through the enforcement of safety statutes, though some such agencies also prescribe standards. In 22 instances the agency administering the compensation law is also given certain additional powers as to safety devices, inspection, etc.

Cost of compensation.—In almost all instances the cost of compensation is borne entirely by the employer, although in some cases where there are governmental insurance funds a small part of the cost is borne by the public. In 1 State (Oregon) the employees contribute to the cost of compensation, in 3 States and Alaska they contribute to the medical benefit fund, and in 5 States they may contribute toward cooperative hospitals and other relief measures. The original occupational disease law of Washington State required equal contributions by employees and employers, but this provision was repealed by an amendment in 1939.

Nonresident alien dependents.—None of the workmen's compensation acts makes any distinction between resident aliens and resident citizens, but a large number have discriminatory provisions affecting nonresident alien dependents. Since 1913, there has been a tendency toward less favorable treatment of this class, by exclusion, reduced benefits, commutation to lump sums in reduced amounts, restricting possible beneficiaries to designated relationships, excluding the presumption of dependency, and excluding payments to beneficiaries in countries with which the United States does not maintain diplomatic relations.

PATIENTS IN HOSPITALS FOR MENTAL DISEASES, 1938

The Bureau of the Census, Department of Commerce, secures an annual census of hospitals for mental disease through data furnished by State, county, city, Veterans' Administration, and private hospitals. A summary of these data for 1938 has been issued.[1]

[1] Vital Statistics—Special Reports, vol 9, No. 48, May 27, 1940, pp 549–558.

The returns are not complete, as some institutions have not yet submitted their schedules. The information made available, however, is of interest with reference to the movement of patient population, and the distribution according to type of hospital control and type of psychosis.

Of the 513,858 patients reported at the close of the year, 457,947 were in hospitals, 1,422 in family care, and 54,849 on parole or otherwise absent. Of the 457,947 mental patients reported hospitalized, 84.0 percent were in State hospitals, 7.9 percent in county and city hospitals, 5.8 percent in Veterans' Administration hospitals, and 2.4 percent in private hospitals.

The percentage distribution of admissions under various types of control of hospitals shows considerable deviation from the percentage distribution of resident patients. The percentage of total admissions coming to private hospitals is more than six times as high as their proportion of patient population.

In State hospitals, first admissions are four times more numerous than readmissions, while in private hospitals they are only twice as frequent. The high proportion that readmissions constitute of total admissions for mental disorders in Veterans' Administration hospitals is stated to be accounted for in part by the fact that first hospitalization may have been for a physical illness, and also in part to the ease with which veterans may secure hospitalization.

Discharges comprise slightly more than half of the separations from State hospitals, and 86 percent of the separations from private hospitals. There are fewer deaths in private hospitals, where the age distribution of the patient population is probably younger and the mental deviation of a milder character.

In State and county and city hospitals more than 10 percent of the patients are on parole, as compared with less than 5 percent in Veterans' Administration and private hospitals.

In 1937, 7 States reported patients placed in family care as compared with 9 States reporting that type of care in 1938.

TABLE 1.—*Movement of patient population in hospitals for mental disease, by type of control of hospital, United States, 1938*

Class of patients	Total	Public hospitals			Private hospitals
		State [1]	County and city	Veterans' Administration	
Patients on books at beginning of year	499,879	424,028	38,735	25,461	11,655
Male	270,735	221,277	19,610	25,407	4,441
Female	229,144	202,751	19,125	54	7,214
In hospital	444,949	374,169	35,421	24,353	11,006
In family care	1,366	1,366			
On parole or otherwise absent	53,564	48,493	3,314	1,108	649
Admissions during year	153,124	106,220	10,317	11,651	24,936
Male	90,584	59,693	5,716	11,617	13,558
Female	62,540	46,527	4,601	34	11,378
First admissions	110,089	79,408	8,133	6,142	16,406
Readmissions	33,190	21,085	1,274	3,228	7,603
Transfers from other hospitals for mental disease	9,845	5,727	910	2,281	927
Separations during year	139,145	95,156	9,791	9,176	25,022
Male	83,728	55,301	5,584	9,145	13,698
Female	55,417	39,855	4,207	31	11,324
Discharges	90,648	56,756	4,863	7,480	21,549
Direct from hospital	48,082	18,795	2,647	6,128	20,512
While on parole	42,566	37,961	2,216	1,352	1,037
Transfers to other hospitals for mental disease	11,368	6,682	1,995	606	2,085
Deaths in hospitals	36,254	30,977	2,848	1,078	1,351
Deaths of patients while on parole	875	741	85	12	37
Patients on books at end of year	513,858	435,092	39,261	27,936	11,569
Male	277,591	225,669	19,742	27,879	4,301
Female	236,267	209,423	19,519	57	7,268
In hospital	457,947	384,573	35,980	26,599	10,795
In family care	1,422	1,422			
On parole or otherwise absent	54,489	49,097	3,281	1,337	774

[1] Figures include 1 Federal hospital, St. Elizabeths, in the District of Columbia, and Morningside Hospital in Portland, Oreg., a Federal contract hospital.

PSYCHOSIS OF FIRST ADMISSIONS, BY TYPE OF CONTROL OF HOSPITALS

Hospitals under each type of control do not admit patients with various mental disorders with equal frequency.

The proportion of patients with general paresis is twice as great in Veterans' Administration hospitals as in State hospitals. First admissions of patients with psychosis associated with conditions of old age (cerebral arteriosclerosis and senile dementia) constitute 21.3 percent in State hospitals, 21.5 in county and city hospitals, and 9.9 percent in private hospitals. The vast majority of veterans have not yet reached the ages in which these diseases manifest themselves; and senile patients and those with cerebral arteriosclerosis are admitted with less frequency to private hospitals.

Private hospitals have a higher proportion of first admissions with manic-depressive psychosis than all others, while the proportion among veterans is decidedly low. Dementia praecox is more nearly uniformly distributed. Patients of this type constitute nearly one-fifth of all first admissions to State and county and city hospitals, and one-seventh of such admissions to Veterans' Administration and private hospitals.

TABLE 2.—*First admissions to hospitals for mental disease, by type of control of hospital and by psychosis, United States, 1938*

Psychosis	Number					Percent distribution				
	Total	Public hospitals			Private hospitals	Total	Public hospitals			Private hospitals
		State	County and city	Veterans' Administration			State	County and city	Veterans' Administration	
Total	110,089	79,408	8,133	6.142	16,406	100.0	100.0	100.0	100.0	100.0
With psychosis	93,345	69,753	6,961	4,080	12,551	84.8	87.8	85.6	66.4	76.5
General paresis	7,816	6,112	601	865	238	7.1	7.7	7.4	14.1	1.5
With other forms of syphilis of the central nervous system	1,496	1,082	92	242	80	1.4	1.4	1.1	3.9	0.5
With epidemic encephalitis	332	254	36	15	27	0.3	0.3	0.4	0.2	0.2
With other infectious diseases	456	315	14	47	80	0.4	0.4	0.2	0.8	0.5
Alcoholic	4,913	3,434	424	280	775	4.5	4.3	5.2	4.6	4.7
Due to drugs and other exogenous poisons	628	316	61	37	214	0.6	0.4	0.8	0.6	1.3
Traumatic	621	471	42	55	53	0.6	0.6	0.5	0.9	0.3
With cerebral arteriosclerosis	11,977	10,407	702	175	693	10.9	13.1	8.6	2.8	4.2
With other disturbances of circulation	719	548	64	18	89	0.7	0.7	0.8	0.3	0.5
With convulsive disorders	1,942	1,586	162	129	65	1.8	2.0	2.0	2.1	0.4
Senile	8,566	6,544	1,047	43	932	7.8	8.2	12.0	0.7	5.7
Involutional psychoses	3,844	2,633	236	35	940	3.5	3.3	2.9	0.6	5.7
Due to other metabolic, etc., diseases	1,338	1,096	87	36	119	1.2	1.4	1.1	0.6	0.7
Due to new growth	173	123	14	5	31	0.2	0.2	0.2	0.1	0.2
With organic changes of the nervous system	895	659	77	81	78	0.8	0.8	0.9	1.3	0.5
Psychoneuroses	4,226	2,234	175	335	1,482	3.8	2.8	2.2	5.5	9.0
Manic-depressive	12,239	8,618	882	294	2,445	11.1	10.9	10.8	4.8	14.9
Dementia praecox (schizophrenia)	21,223	16,395	1,488	928	2,412	19.3	20.6	18.3	15.1	14.7
Paranoia and paranoid conditions	1,857	1,208	188	21	440	1.7	1.5	2.3	0.3	2.7
With psychopathic personality	1,206	854	51	79	222	1.1	1.1	0.6	1.3	1.4
With mental deficiency	3,054	2,554	226	133	141	2.8	3.2	2.8	2.2	0.9
Undiagnosed and unknown psychosis	3,824	2,310	292	227	995	3.5	2.9	3.6	3.7	6.1
Without psychosis	16,744	9,655	1,172	2,062	3,855	15.2	12.2	14.4	33.6	23.5
Epilepsy	641	362	112	56	111	0.6	0.5	1.4	0.9	0.7
Mental deficiency	1,626	1,307	156	98	65	1.5	1.7	1.9	1.6	0.4
Alcoholism	7,575	4,230	656	382	2,307	6.9	5.3	8.1	6.2	14.1
Drug addiction	922	420	40	41	421	0.8	0.5	0.5	0.7	2.6
Personality disorders due to epidemic encephalitis	159	101	20	21	.17	0.1	0.1	0.2	0.3	0.1
Psychopathic personality	1,095	678	65	188	164	1.0	0.9	0.8	3.1	1.0
Primary behavior disorders	408	271	19	21	97	0.4	0.3	0.2	0.3	0.6
Unclassified without psychosis	4,258	2,226	104	1,255	673	3.9	2.8	1.3	20.4	4.1

INCUBATION PERIOD OF RABIES IN DOGS

It is well known that the incubation period of rabies in human beings and animals shows great variation. It is fortunate from the standpoint of prevention that this period is prolonged, usually allowing a sufficient time for immunity to develop following the Pasteur prophylactic treatment.

Dr. J. C. Geiger, director of public health of San Francisco, has recently reported a case of rabies in a dog in that city developing 109 days after having been bitten by a rabid dog. The dog was bitten on April 16, 1940, by a sick, stray animal, which later died and was proved positive for rabies. The bitten animal showed a slight wound on the left hind leg, and, in accordance with the regulations of the Department of Public Health, was confined in isolation at the public pound for 3 months (until July 19, 1940). The physical examination of this animal on release was negative. On August 3, the animal became sick and was sent to a private veterinary hospital, where it died on August 6. Microscopic examination of the brain supported the tentative clinical diagnosis of rabies.

This case presents two important points in the control of rabies—the need for effective control of the dog population through license and provision for the impounding and humane destruction of all unlicensed animals, and the question of the quarantine period for a dog that has been bitten by a rabid dog.

Dr. Geiger states that up to May 15, 1939, San Francisco had been free from rabies for many years. The present case makes a total of 66 cases of rabies in dogs reported in San Francisco.

CANCER MORTALITY IN THE UNITED STATES

A REVIEW

A statistical review of recorded mortality from cancer in the United States has been undertaken as a part of various phases of cancer investigation being made by the National Cancer Institute. Public Health Bulletins Nos. 248 [1] and 252 [2] are the first in a series of studies of cancer mortality in the United States made from unpublished data made available by the United States Bureau of the Census. Annual records of deaths from cancer afford a large body of data which are of value with respect to a study, particularly of the trend and geographic distribution of cancer mortality.

Bulletin No. 248 deals with the trend of recorded cancer mortality in the original registration States from 1900 to 1935. Detailed tables and charts show the trend of recorded cancer mortality among males and females in 10-year age groups, for broad groups of site of cancer,

[1] Public Health Bulletin No. 248. Cancer mortality in the United States. I. Trend of recorded cancer mortality in the death registration States of 1900 from 1900 to 1935. By Associate Statistician Mary Gover. Government Printing Office, Washington, 1939. For sale by the Superintendent of Documents. Price 10 cents.

[2] Public Health Bulletin No. 252. Cancer mortality in the United States. II. Recorded cancer mortality in geographic sections of the death registration States of 1920 from 1920 to 1935. By Associate Statistician Mary Gover. Government Printing Office, Washington, 1940. For sale by the Superintendent of Documents. Price 10 cents.

namely, buccal cavity; skin; female genital organs; breast; stomach, liver; peritoneum, intestines, rectum; and other or unspecified organs. The trends for broad groups of site of cancer are supplemented by trends for the detailed sites included in each broad group of cancer mortality. The trends for detailed sites, in the original registration States, are based on a rate for the year 1925 and the successive years from 1930 to 1935 inclusive, and also on two rates in the registration States of 1914 for the years 1914 and an average of the three years 1930–32. Rates for specific sites of cancer are for all ages only and are adjusted to the age distribution of the total population of the United States as enumerated in 1930.

Comparisons are made between trends for specific ages, between males and females, and between external and internal sites of cancer.

Bulletin No. 252 shows the trend of recorded cancer mortality in five geographic sections of the United States from 1920 to 1935. Charts of the trends of rates for all ages, adjusted to the age distribution of the total population of the United States in 1930, are shown for each of the broad groups of cancer mortality, for males and females in the several sections. Appendix tables also include rates for specific ages, under 35, 35–54, 55–74, and 75 years and over. Rates for white persons for the southern section are included in the appendix tables as well as those for white and colored combined.

The trends of mortality from cancer of various sites show some difference among the sections. For example, cancer of the buccal cavity has decreased in the Northeast and East North Central sections while it has increased in the West Central and South, and remained level in the Pacific region; skin cancer shows a decline in three of the five sections, the Northeast, East North Central, and West Central, while it has remained practically level in the South and the Pacific region.

The magnitude of the rate for broad groups of site of cancer is compared in the several sections, based on age-adjusted rates for an average of the years 1931–35. Rates for all cancer, and for internal sites of cancer including stomach, liver; peritoneum, intestines, rectum; and other or unspecified organs are highest in the Northeast; the East North Central and the Pacific have much the same rates; the West Central is somewhat lower, and the South has the lowest rates. Among the external sites of cancer the high rate for cancer of the buccal cavity among southern females, the high rate for skin cancer among both males and females in the South, and the relatively high rate for cancer of the female genital organs in the South are noted.

Mortality from cancer of specific sites among colored persons is

compared with that among white persons in both northern and southern sections of the United States. Mortality from all cancer among colored males is lower than that among the whites and lower in the South than in the North. Among colored females mortality from all cancer is higher than that among whites in both sections and is lower in the South than in the North. The high rate of buccal-cavity cancer among colored females, particularly in the North, the low rate of skin cancer among both colored males and females, a rate for breast cancer which is equivalent to the white rate in both North and South, and the comparatively high rate for cancer of the genital organs among colored females in both North and South are noted.

COURT DECISION ON PUBLIC HEALTH

Compensation under workmen's compensation act denied because of noncompliance with statute requiring health certificate and medical examination.—(Texas Commission of Appeals, sec. A; *Rogers* v. *Traders & General Ins. Co.*, 139 S.W.2d 784; decided May 15, 1940.) A Texas law provided that no person operating a bakery should employ any person who, at the time of his employment, did not have in his possession a physician's certificate showing examination for and freedom from any infectious or contagious disease. The statute also required a bakery operator to have his employees medically examined at intervals of not to exceed six months.

A claim was made under the workmen's compensation act by the plaintiff because of injuries received in a bakery for which he had been working for several months prior to receiving his injuries. Under the compensation act an employee was defined as "every person in the service of another under any contract of hire, expressed or implied, oral or written." It was established without controversy that when the plaintiff was employed by the bakery he did not have in his possession a health certificate and that he was never examined by a physician to determine whether he was suffering from any infectious or contagious disease. The question presented to the commission of appeals for decision was whether or not the plaintiff was an employee of the bakery within the purview of the definition of that term as contained in the compensation law. The view was taken that the contract of hire was void because it violated the law requiring a health certificate and medical examination, and compensation was, therefore, denied on the ground that the plaintiff was not an employee within the terms of the compensation statute.

DEATHS DURING WEEK ENDED AUGUST 10, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 10, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,210	7,201
Average for 3 prior years	7,348	
Total deaths, first 32 weeks of year	278,732	272,977
Deaths under 1 year of age	501	478
Average for 3 prior years	510	
Deaths under 1 year of age, first 32 weeks of year	16,191	16,275
Data from industrial insurance companies:		
Policies in force	64,916,651	66,792,520
Number of death claims	12,147	10,821
Death claims per 1,000 policies in force, annual rate	9.8	8.4
Death claims per 1,000 policies, first 32 weeks of year, annual rate	10.0	10.6

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 17, 1940

Summary

No significant changes occurred during the current week in the communicable disease situation with reference to the 9 common communicable diseases included in the weekly telegraphic reports presented in the tables on the following pages. Only influenza, measles, and poliomyelitis were above the 5-year (1935–39) median expectancy, and the cumulative figures to date for each of these 9 diseases, with the single exception of influenza, are below the cumulative totals for the median of the past 5 years for the corresponding period.

The number of reported cases of poliomyelitis increased from 275 for the preceding week to 389, slightly above the 5-year median of 343 for the corresponding week. Increases were reported for all geographic areas except the West South Central, where the number of cases was the same as last week, and the Mountain States, which reported a decrease. The largest numerical increases are recorded for the East North Central States (92 to 144), West North Central (61 to 80), and the South Atlantic (28 to 46), which areas reported 70 percent of the cases for the current week. The individual States reporting the largest numbers of cases were Indiana (58), Michigan (41), Ohio (36), West Virginia (31), Kansas (30), Iowa (25), and California (23).

A low weekly record of only 6 cases of smallpox is recorded for the current week—4 States reporting only 1 case and 1 State reporting 2 cases. Twenty-two cases of Rocky Mountain spotted fever were reported in the Eastern and Central States, while only 1 case was reported in the Northwest (Wyoming). Thirty-six cases of endemic typhus fever were reported in the South Atlantic and South Central States, 14 of which occurred in Georgia.

For the current week the Bureau of the Census reports 6,948 deaths in 88 major cities of the United States, as compared with 7,210 for the preceding week and with a 3-year (1937–39) average of 7,426 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended August 17, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39
	Aug. 17, 1940	Aug. 19, 1939		Aug. 17, 1940	Aug. 19, 1939		Aug. 17, 1940	Aug. 19, 1939		Aug. 17, 1940	Aug. 19, 1939	
NEW ENG.												
Maine	1	0	0	1	3	-------	15	3	6	0	0	0
New Hampshire	0	0	0	-------	-------	-------	1	0	2	0	0	0
Vermont	0	0	0	-------	-------	-------	12	9	9	0	0	0
Massachusetts	6	4	3	-------	-------	-------	97	65	50	0	0	1
Rhode Island	0	0	0	-------	-------	-------	11	16	0	0	0	0
Connecticut	0	0	1	1	-------	-------	11	17	10	0	0	0
MID. ATL.												
New York	7	9	17	[1]6	[1]6	[1]1	152	65	127	3	7	7
New Jersey [2]	7	3	5	2	2	4	64	15	36	0	1	1
Pennsylvania [2]	5	8	17	-------	-------	-------	61	18	53	2	5	4
E. NO. CEN.												
Ohio	2	7	15	5	-------	5	15	10	32	0	0	1
Indiana	5	6	6	1	3	3	3	8	5	0	0	0
Illinois	13	11	17	1	2	3	27	10	20	2	1	1
Michigan [3]	0	7	7	-------	2	1	101	26	36	0	1	1
Wisconsin	0	0	1	8	23	15	125	35	37	0	0	0
W. NO. CEN.												
Minnesota	0	3	2	1	3	1	6	11	11	0	0	0
Iowa [2]	0	5	3	-------	-------	-------	15	28	4	2	1	1
Missouri	2	2	9	-------	-------	30	0	1	8	0	0	1
North Dakota	2	0	0	5	-------	1	1	3	3	0	0	0
South Dakota	1	0	1	-------	-------	-------	2	0	0	0	0	0
Nebraska	1	6	2	-------	-------	-------	0	2	2	1	1	1
Kansas	3	2	3	-------	-------	-------	14	3	5	0	0	1
SO. ATL.												
Delaware	0	0	0	-------	-------	-------	0	1	1	0	0	0
Maryland [2, 3]	1	5	5	-------	-------	-------	4	1	5	0	1	3
Dist. of Col. [2]	0	0	3	-------	-------	-------	1	6	5	1	0	3
Virginia [2, 4]	6	13	15	47	41	-------	33	21	21	1	1	1
West Virginia [3]	11	5	8	7	11	11	4	3	4	0	2	2
North Carolina [2]	6	27	23	-------	-------	-------	2	5	8	0	1	1
South Carolina [4]	4	9	5	145	140	50	3	1	4	0	3	0
Georgia [2, 4]	6	20	20	7	11	-------	4	5	0	0	0	0
Florida [4]	1	3	5	1	1	-------	1	1	2	0	0	0
E. SO. CEN.												
Kentucky	10	8	8	8	5	3	26	1	8	2	2	2
Tennessee [2, 4]	5	11	13	26	4	4	5	4	4	1	0	2
Alabama [4]	9	15	15	2	18	8	13	6	5	0	0	0
Mississippi [3]	4	18	15	-------	-------	-------	-------	0	-------	1	0	1
W. SO. CEN.												
Arkansas	5	15	11	4	7	4	13	0	1	0	0	0
Louisiana [4]	6	9	13	1	5	11	4	9	5	0	0	2
Oklahoma [3, 4]	3	8	6	3	9	9	1	8	3	0	1	1
Texas [4]	27	10	36	122	27	40	47	6	12	2	2	2
MOUNTAIN												
Montana	1	0	1	3	2	2	10	9	9	0	0	1
Idaho	0	0	0	-------	-------	-------	2	2	2	0	1	0
Wyoming [2]	1	1	0	-------	-------	-------	1	9	1	0	0	0
Colorado	4	2	2	4	1	-------	5	4	5	0	0	1
New Mexico	0	1	1	1	-------	-------	9	2	4	0	0	0
Arizona	0	5	1	9	7	7	3	1	1	0	2	1
Utah [3]	0	0	1	-------	2	-------	19	9	9	0	0	0
PACIFIC												
Washington	2	0	1	-------	-------	-------	20	51	11	0	0	0
Oregon	3	0	1	3	2	8	11	7	7	1	0	0
California	7	14	19	9	14	10	54	81	81	0	1	3
Total	177	272	341	433	351	324	1,028	598	879	19	34	56
33 weeks	8,865	11,968	14,515	169,222	151,650	141,707	228,492	348,447	348,447	1,117	1,387	4,165

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 17, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Aug. 17, 1940	Aug. 19, 1939		Aug. 17, 1940	Aug. 19, 1939		Aug. 17, 1940	Aug. 19, 1939		Aug. 17, 1940	Aug. 19, 1939	
NEW ENG.												
Maine	8	0	4	4	2	2	0	0	0	0	0	4
New Hampshire	0	0	0	2	1	1	0	0	0	0	0	0
Vermont	0	0	0	5	1	3	0	0	0	0	0	0
Massachusetts	3	6	6	18	15	34	0	0	0	2	3	2
Rhode Island	2	0	0	0	1	1	0	0	0	2	0	1
Connecticut	8	8	3	3	5	7	0	0	0	0	1	2
MID. ATL.												
New York	7	39	39	55	50	82	0	0	0	11	8	28
New Jersey [2]	1	12	12	21	15	16	0	0	0	8	8	9
Pennsylvania [2]	3	15	12	40	66	66	0	0	0	18	12	18
E. NO. CEN.												
Ohio	36	3	9	38	32	52	0	0	1	10	11	19
Indiana	58	2	2	14	19	14	0	3	2	6	13	9
Illinois	7	13	13	52	48	66	1	3	2	11	14	21
Michigan [3]	41	87	21	37	65	65	1	1	1	3	15	14
Wisconsin	2	0	1	30	84	37	0	3	1	1	0	2
W. NO. CEN.												
Minnesota	5	39	5	18	17	20	0	0	0	3	0	1
Iowa [3]	25	0	2	16	12	12	2	5	1	1	3	5
Missouri	11	1	1	1	13	17	0	1	2	6	24	22
North Dakota	4	0	0	2	2	4	0	0	1	0	1	0
South Dakota	3	0	1	5	7	9	0	0	0	0	1	1
Nebraska	2	0	0	0	5	5	0	0	0	3	0	0
Kansas	30	3	2	21	20	20	0	0	0	4	11	11
SO. ATL.												
Delaware	0	2	0	1	0	1	0	0	0	2	1	1
Maryland [2 3]	0	1	2	8	9	9	0	0	0	5	10	10
Dist. of Col.[3]	0	4	3	2	5	3	0	0	0	1	3	3
Virginia [2 4]	9	0	1	6	7	7	0	0	0	9	28	25
West Virginia [3]	31	0	2	12	19	11	0	5	0	15	15	21
North Carolina [3]	3	7	7	14	21	19	0	0	0	11	22	22
South Carolina [4]	0	15	0	2	6	1	0	0	0	14	11	15
Georgia [2 4]	1	4	2	9	10	9	0	0	0	24	32	32
Florida [4]	2	3	3	0	0	3	0	0	0	0	1	3
E. SO. CEN.												
Kentucky	19	3	4	15	21	21	0	0	0	16	30	48
Tennessee [2 4]	3	3	8	15	22	12	0	0	0	21	28	54
Alabama [4]	3	0	2	12	21	8	1	0	0	13	20	17
Mississippi [3]	0	1	2	0	2	5	0	0	0	14	7	6
W. SO. CEN.												
Arkansas	2	1	1	11	4	6	0	1	0	13	25	18
Louisiana [4]	4	1	2	5	5	9	0	0	0	36	21	21
Oklahoma [2 4]	9	1	1	7	6	6	0	3	0	27	32	27
Texas [4]	8	11	2	17	10	28	0	0	0	75	55	34
MOUNTAIN												
Montana	7	0	0	4	10	8	0	0	1	0	2	4
Idaho	0	0	0	1	1	1	0	0	0	0	3	2
Wyoming [2]	0	0	0	0	0	0	0	0	0	0	1	1
Colorado	0	8	2	10	10	10	1	0	0	2	5	1
New Mexico	1	1	0	1	4	4	0	0	0	2	3	9
Arizona	0	1	0	0	1	1	0	0	0	0	5	4
Utah [3]	1	0	0	5	8	8	0	0	0	1	0	0
PACIFIC												
Washington	13	1	1	8	8	8	0	0	0	4	6	3
Oregon	4	2	1	5	8	8	0	0	0	0	4	3
California	23	55	25	50	47	51	0	0	1	4	16	11
Total	389	343	343	602	690	810	6	25	30	401	503	563
33 weeks	2,059	2,148	2,148	118,887	110,482	104,850	1,958	8,657	7,974	4,9[illegible]3	7,105	8,141

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 17, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended Aug. 17, 1940	Whooping cough, Week ended Aug. 19, 1939
NEW ENG.		
Maine	34	30
New Hampshire	0	2
Vermont	21	45
Massachusetts	142	90
Rhode Island	0	14
Connecticut	32	48
MID. ATL.		
New York	298	368
New Jersey [2]	88	146
Pennsylvania [2]	318	392
E. NO. CEN.		
Ohio	310	83
Indiana	9	57
Illinois	155	268
Michigan [3]	275	158
Wisconsin	98	143
W. NO. CEN.		
Minnesota	42	47
Iowa [2]	20	9
Missouri	11	1
North Dakota	23	7
South Dakota	7	3
Nebraska	2	13
Kansas	[illegible]	16
SO. ATL.		
Delaware	7	10
Maryland [2,3]	123	54
Dist. of Col. [2]	12	39
Virginia [2,4]	71	50
West Virginia [3]	69	10
North Carolina [2]	90	71
SO. ATL.—continued		
South Carolina [4]	13	27
Georgia [2,4]	8	22
Florida [4]	3	16
E. SO. CEN.		
Kentucky	85	44
Tennessee [2,4]	47	55
Alabama [4]	15	35
Mississippi [3]	-------	-------
W. SO. CEN.		
Arkansas	11	5
Louisiana [4]	8	10
Oklahoma [2,4]	4	1
Texas [4]	202	48
MOUNTAIN		
Montana	17	6
Idaho	5	1
Wyoming [2]	3	1
Colorado	13	8
New Mexico	45	5
Arizona	7	38
Utah [3]	64	48
PACIFIC		
Washington	59	11
Oregon	18	13
California	326	105
Total	3,295	2,673
33 weeks	107,172	126,631

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Aug. 17, 1940, 23 cases as follows: New Jersey, 1; Pennsylvania, 1; Iowa, 4; Maryland, 4; District of Columbia, 2; Virginia, 2; North Carolina, 4; Georgia, 1; Tennessee, 2; Oklahoma, 1; Wyoming, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Aug. 17, 1940, 36 cases as follows: Virginia, 1; South Carolina, 1; Georgia, 14; Florida, 5; Alabama, 6; Louisiana, 4; Oklahoma, 1; Texas, 4. The report of a case of typhus fever in Tennessee for the week ended Aug. 10 was later found to be incorrect.

WEEKLY REPORTS FROM CITIES

City reports for week ended August 3, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5 year average	84	26	11	492	275	266	4	351	70	1,378	--------
Current week [1]	45	26	3	752	297	158	0	321	70	1,200	--------
Maine:											
Portland	0	------	0	4	1	0	0	0	0	4	32
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	12
Nashua	0	------	0	0	0	0	0	0	0	0	11
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	9
Rutland	0	------	0	0	1	0	0	0	0	0	8
Massachusetts:											
Boston	1	------	0	59	10	8	0	7	0	52	189
Fall River	0	------	0	9	1	0	0	2	0	4	28
Springfield	0	------	0	7	0	1	0	1	0	3	33
Worcester	0	------	0	64	5	0	0	1	0	14	45
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	11
Providence	0	------	0	26	3	0	0	0	0	4	41
Connecticut:											
Bridgeport	0	------	0	0	0	0	0	1	0	2	29
Hartford	0	------	0	2	1	0	0	0	1	0	36
New Haven	0	------	0	0	1	1	0	0	1	2	35
New York:											
Buffalo	0	------	0	1	11	4	0	6	0	5	144
New York	7	4	0	158	50	23	0	63	11	141	1,462
Rochester	0	------	0	3	1	0	0	0	1	6	55
Syracuse	0	------	0	0	0	4	0	0	0	8	44
New Jersey:											
Camden	0	------	0	6	3	2	0	2	0	1	50
Newark	0	------	0	52	5	1	0	3	0	29	97
Trenton	0	------	0	0	2	2	0	3	4	1	34
Pennsylvania:											
Philadelphia	1	------	0	76	15	14	0	20	3	36	469
Pittsburgh	2	------	1	2	8	3	0	9	1	25	155
Reading	0	------	0	6	0	0	0	0	0	21	19
Scranton	0	------	--------	0	------	0	0	------	0	2	--------
Ohio:											
Cincinnati	0	------	0	0	7	2	0	4	0	28	188
Cleveland	0	2	0	5	11	10	0	6	0	122	209
Columbus	0	------	0	0	1	0	0	3	1	38	89
Indiana:											
Anderson	0	------	0	0	0	0	0	1	0	1	11
Fort Wayne	1	------	0	0	1	0	0	0	0	1	24
Indianapolis	1	------	0	1	3	1	0	4	0	3	114
Muncie	0	------	0	0	0	0	0	1	0	0	14
South Bend	0	------	0	0	1	0	0	0	0	4	19
Terre Haute	0	------	0	0	1	1	0	0	0	0	18
Illinois:											
Alton	0	------	0	0	1	3	0	3	0	3	17
Chicago	6	1	0	53	20	19	0	36	1	72	723
Elgin	0	------	0	0	0	0	0	0	0	1	12
Moline	0	------	0	0	0	0	0	0	0	0	11
Springfield	0	------	0	0	2	0	0	0	0	6	22
Michigan:											
Detroit	2	7	0	89	8	12	0	15	1	117	284
Flint	0	------	0	0	1	3	0	0	0	3	13
Grand Rapids	0	------	0	4	0	1	0	0	0	10	39
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	0	7
Madison	0	------	0	7	2	0	0	0	0	6	13
Milwaukee	0	------	0	70	0	5	0	2	0	10	125
Racine	0	------	0	0	0	4	0	0	0	1	8
Superior	0	------	0	1	0	0	0	0	0	2	11

[1] Figures for Barre and Raleigh estimated; reports not received.

City reports for week ended August 3, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	3	0	0	0	0	0	0	19
Minneapolis	0	------	0	0	4	3	0	3	1	7	80
St. Paul	0	------	0	0	1	1	0	1	0	7	52
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Des Moines	0	------	0	0	0	0	0	0	0	0	40
Sioux City	0	------	------	0	------	0	0	------	0	0	------
Waterloo	0	------	------	4	------	1	0	------	1	0	------
Missouri:											
Kansas City	0	------	0	1	8	0	0	4	0	3	118
St. Joseph	0	------	0	0	9	0	0	1	0	1	34
St. Louis	0	------	0	2	4	2	0	7	8	22	302
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	0	0	7
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	2
South Dakota:											
Aberdeen	0	------	------	1	------	0	1	0	0	6	------
Nebraska:											
Lincoln	0	------	------	0	------	0	0	------	0	0	------
Omaha	0	------	0	0	2	0	0	1	0	1	79
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	1	0	8
Topeka	0	------	0	2	1	0	0	0	0	0	23
Wichita	0	------	0	0	3	1	0	0	0	18	25
Delaware:											
Wilmington	0	------	0	0	1	0	0	0	0	3	39
Maryland:											
Baltimore	1	------	0	0	10	3	0	15	1	119	280
Cumberland	0	------	0	0	0	0	0	0	0	0	12
Frederick	0	------	0	0	1	0	0	0	0	0	4
Dist. of Col.:											
Washington	3	------	------	2	10	1	0	10	0	6	220
Virginia:											
Lynchburg	1	------	0	0	1	0	0	0	1	4	12
Norfolk	0	------	0	1	2	1	0	1	0	0	48
Richmond	0	------	1	1	4	2	0	1	0	0	60
Roanoke	0	------	0	3	0	0	0	0	0	5	6
West Virginia:											
Charleston	0	1	------	0	0	0	0	0	0	0	0
Wheeling	0	------	0	0	1	0	0	1	0	5	16
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	------	------	------	------	------	------	------	------	------	------	------
Wilmington	0	------	0	0	1	1	0	0	0	0	10
Winston-Salem	4	------	0	0	0	2	0	1	0	6	13
South Carolina:											
Charleston	0	1	0	6	2	0	0	1	1	0	35
Florence	0	1	0	0	1	0	0	0	0	0	14
Greenville	0	------	0	0	2	0	0	0	0	3	20
Georgia:											
Atlanta	0	------	0	1	3	0	0	4	0	4	92
Brunswick	0	------	0	0	0	0	0	0	0	1	3
Savannah	0	2	0	0	5	0	0	5	0	0	37
Florida:											
Miami	0	------	0	0	1	0	0	0	0	1	31
Tampa	0	------	0	0	0	0	0	0	1	0	27
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	0	0	7
Covington	0	------	0	0	4	1	0	0	0	8	23
Lexington	0	------	0	2	1	0	0	1	0	1	12
Louisville	1	------	0	1	6	1	0	5	0	15	148
Tennessee:											
Knoxville	0	------	0	0	1	0	0	1	0	4	28
Memphis	0	------	0	2	0	0	0	4	2	2	89
Nashville	0	------	0	0	6	0	0	8	1	16	67
Alabama:											
Birmingham	0	3	0	8	3	0	0	2	0	1	86
Mobile	0	------	0	0	0	1	0	0	0	0	21
Montgomery	0	------	------	0	------	0	0	------	0	1	------

City reports for week ended August 3, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	1	0	------
Little Rock	0	------	0	0	4	0	0	2	0	3	------
Louisiana:											
New Orleans	1	------	0	0	8	4	0	16	5	4	101
Shreveport	0	------	0	0	3	0	0	1	2	0	39
Oklahoma:											
Oklahoma City	0	------	0	0	3	1	0	1	0	0	36
Tulsa	0	------	0	0	2	0	0	0	0	16	35
Texas:											
Dallas	1	1	1	5	4	0	0	2	2	8	75
Fort Worth	0	------	0	4	0	0	0	2	1	6	37
Galveston	0	------	0	0	3	0	0	0	0	0	18
Houston	2	------	0	0	4	0	0	7	6	8	75
San Antonio	0	------	0	0	3	0	0	3	1	11	79
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	6
Great Falls	0	------	0	1	0	0	0	0	0	0	3
Helena	0	------	0	0	0	0	0	0	0	0	1
Missoula	0	------	0	0	0	0	0	0	0	0	5
Idaho:											
Boise	0		0	0	0	0	0	0	0	0	4
Colorado:											
Colorado Springs	0	------	0	0	1	0	0	0	0	0	13
Denver	7	------	0	1	5	1	0	4	0	7	71
Pueblo	0	------	0	0	0	0	0	0	0	0	5
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	0	0	0	10
Utah:											
Salt Lake City	0	------	0	6	0	0	0	0	0	31	28
Washington:											
Seattle	0	------	0	0	2	3	0	6	0	14	97
Spokane	0	------	0	0	1	6	0	1	0	1	24
Tacoma	0	0	0	0	1	1	0	2	0	0	22
Oregon:											
Portland	1	------	0	2	2	0	0	3	0	8	77
Salem	0	------	------	0	------	0	0	------	0	1	------
California:											
Los Angeles	4	3	0	8	1	4	0	16	13	49	322
Sacramento	0	------	0	1	1	0	0	0	1	2	19
San Francisco	0	1	0	1	2	1	0	8	1	55	159

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Iowa—Continued.			
Boston	0	0	2	Sioux City	0	0	5
Worcester	1	0	0	Waterloo	0	0	1
New York:				Missouri: Kansas City	0	0	2
Buffalo	0	1	0	Nebraska: Omaha	0	0	1
New York	1	0	2	Kansas: Wichita	0	0	7
New Jersey: Newark	1	1	0	Oklahoma: Oklahoma City	0	0	2
Pennsylvania: Pittsburgh	1	0	0	Texas:			
Ohio:				Dallas	0	0	4
Cincinnati	0	0	1	Houston	1	0	2
Cleveland	0	0	2	Montana: Billings	0	0	2
Illinois: Chicago	0	0	1	California:			
Michigan: Detroit	0	0	3	Los Angeles	0	0	9
Wisconsin: Kenosha	0	0	1	San Francisco	0	0	1
Iowa:				Washington: Tacoma	0	0	4
Cedar Rapids	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: Springfield, Mass., 1; New York, 1; Sacramento, 2.
Pellagra.—Cases: Philadelphia, 1; Savannah, 1; Birmingham, 1; Montgomery, 2.
Typhus fever.—Cases: New York, 1; Charleston, S. C., 1; Savannah, 2; Miami, 1; Tampa, 1; Montgomery, 2.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 13, 1940.—During the week ended July 13, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2	1					3
Chickenpox		29	1	89	204	33	20		12	388
Diphtheria		1	2	15		2				20
Dysentery				5	2					7
Influenza					3				42	45
Measles	2	17	4	32	198	60	84	4	58	459
Mumps				6	57	1	3		5	72
Pneumonia					16	6	1		10	33
Poliomyelitis					3					3
Scarlet fever		2	2	33	63	7	2	6	2	117
Trachoma									1	1
Tuberculosis	5	2	17	39	41	2	44			150
Typhoid and paratyphoid fever				10	3		2	2	2	19
Whooping cough		14	4	141	88	11	16	15	6	295

CUBA

Habana—Communicable diseases—4 weeks ended June 29, 1940.—During the 4 weeks ended June 29, 1940, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	10	1	Tuberculosis	3	3
Malaria	2		Typhoid fever	72	13
Scarlet fever	2				

GREAT BRITAIN

England and Wales—Infectious diseases—13 weeks ended December 31, 1939.—During the 13 weeks ended December 31, 1939, cases of certain infectious diseases were reported in England and Wales, as follows:

Disease	Cases	Disease	Cases
Diphtheria	12,140	Puerperal pyrexia	2,005
Dysentery	583	Scarlet fever	16,910
Ophthalmia neonatorum	963	Typhoid fever	800
Pneumonia	6,744		

England and Wales—Vital statistics—Fourth quarter 1939.—During the fourth quarter ended December 31, 1939, 141,108 live births and 121,431 deaths were registered in England and Wales. The following statistics were taken from the Quarterly Return of Births, Deaths, and Marriages issued by the Registrar General and are provisional:

Birth and death rates in England and Wales, quarter ended Dec. 31, 1939

Annual rates per 1,000 population:	
Live births	13.5
Stillbirths	.54
Deaths, all causes	11.6
Deaths under 1 year of age	[1] 48

[1] Per 1,000 live births.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of July 26, 1940, pages 1367–1370. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Algeria—Algiers.—During the week ended August 10, 1940, 1 case of plague was reported in Algiers, Algeria.

Hawaii Territory—Island of Hawaii—Hamakua District.—A rat found on July 17, 1940, in Paauilo, Hamakua Mill area, and two rats, one found on July 16 and one on July 17, in Paauhau area approximately 1½ miles from Honokaa village, all in Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

Yellow Fever

Colombia—Santander Department—San Vincente de Chucuri.—On July 17, 1940, 1 death from yellow fever was reported in San Vincente de Chucuri, Santander Department, Colombia.

Public Health Reports

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IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

July 14-August 10, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease". The table gives the number of cases of these diseases for the 4-week period ended August 10, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

With the exception of influenza and measles, the incidence during the 4 weeks ended August 10 of the eight communicable diseases under consideration was again below the median expectancy for the period.

Influenza.—The number of cases (1,476) of influenza reported for the 4 weeks ended August 10 was about 38 percent higher than the number reported for the corresponding period in 1939 and about 50 percent higher than the median incidence for this period. The increase seemed to be largely due to a somewhat higher incidence in the West South Central and South Atlantic regions than would normally be expected at this season of the year.

Measles.—The number of cases (10,086) of measles reported for the 4 weeks ended August 10 was 80 percent higher than the number reported for the corresponding period in 1939, and 22 percent higher than the median incidence for this period. The increase is reflected largely in the higher incidence in the New England and Middle Atlantic regions, but all sections except the South Atlantic and Pacific reported more cases than the median expectancy for the region.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended August 10 there were 640 cases of diphtheria reported, as compared with 1,030, 1,288, and 1,158 cases for the corresponding period in 1939, 1938, and 1937, respec-

tively. The current incidence was about 62 percent of the incidence last year and about 55 percent of the 1935–39 median figure for this period.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period July 14–Aug. 10, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	640	1,030	1,158	1,476	1,069	987	10,086	5,600	8,294	106	122	250
New England	16	16	52	3	1	3	1,027	899	899	5	5	9
Middle Atlantic	74	129	158	13	20	20	3,213	1,384	2,631	17	31	40
East North Central	110	136	211	93	91	107	2,618	600	2,328	11	11	45
West North Central	63	46	74	11	14	97	373	265	265	13	7	14
South Atlantic	124	281	265	526	554	317	400	409	535	21	19	48
East South Central	50	156	156	59	106	97	372	90	109	20	24	24
West South Central	91	107	192	636	177	212	362	231	184	8	16	15
Mountain	51	70	62	86	64	64	345	238	308	4	4	7
Pacific	61	86	83	49	42	57	476	1,484	977	7	5	15
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	716	783	783	2,985	3,117	3,796	108	178	239	1,481	2,001	2,322
New England	7	16	22	157	195	252	0	0	0	33	40	39
Middle Atlantic	19	71	71	796	637	747	0	0	0	122	140	171
East North Central	183	214	76	939	921	1,404	20	66	66	113	220	258
West North Central	127	69	28	256	359	419	45	57	81	113	128	128
South Atlantic	65	113	102	244	320	286	1	1	2	284	493	542
East South Central	42	28	83	147	176	158	8	2	2	185	337	436
West South Central	89	42	25	103	112	153	6	9	9	513	541	604
Mountain	41	22	13	100	152	163	20	12	40	45	51	68
Pacific	143	208	97	243	255	315	8	31	45	73	51	66

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 41 States and New York City.
[3] 47 States. Mississippi is not included

Meningococcus meningitis.—The incidence of meningococcus meningitis remained at a low level. For the current period there were 106 cases reported, as compared with 122 for the corresponding period in 1939 and a median of 250 cases for the years 1935–39. Each section of the country shared in the favorable situation of this disease that now exists, but in the West North Central and East South Central regions the cases for the current period were only slightly less than the 1935–39 median.

Poliomyelitis.—Of a total of 716 cases of poliomyelitis reported for the 4 weeks ended August 10, Indiana reported 70, Washington 67, California and Kansas 65 each, Michigan 54, West Virginia 43, Texas and Ohio 37 each, Iowa 36, Louisiana 31, Kentucky 26, Montana 21, Oklahoma 19, and Illinois 16; approximately 82 percent of the cases occurred in those 14 States. For the country as a whole the current incidence is approximately 91 percent of the 1939 figure for

this period, which number (783 cases) also represents the 1935–39 median.

Scarlet fever.—The scarlet fever incidence (2,985 cases) was slightly lower than the recorded incidence for the corresponding period in 1939, but it was only about 79 percent of the average incidence for recent years. The Middle Atlantic region reported a slight increase over the 1935–39 median incidence, but other regions report very definite declines from the seasonal expectancy.

Smallpox.—The smallpox incidence also remained at a low level, the current incidence (108 cases) being the lowest on record for this period. In the East South Central region the number of cases was slightly higher than might be expected, but other regions reported a significantly low incidence.

Typhoid fever.—The recent favorable record for typhoid fever was maintained during the current period. The number of reported cases (1,481) was only about 74 percent of the number reported in 1939 and approximately 64 percent of the 1935–39 median incidence for this period. The situation was favorable in all sections of the country except the Pacific where the number of cases reported was slightly higher than the median expectancy.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended August 10, based on data received from the Bureau of the Census, was 10.8 per 1,000 inhabitants (annual basis). The average rate for the years 1935–39 was 10.3. In the two middle weeks of the period (weeks ended July 27 and August 3) the death rates were higher than in either adjacent week (11.9 and 11.7 as compared with 10.0 and 9.6 in the weeks preceding and following). Such excesses at this season of the year are usually due to excessive heat. An examination of data for individual cities indicates that the phenomenon was widespread, including cities from the East coast to Minneapolis and even Los Angeles. In 25 large cities the deaths for one or both of the weeks ended July 27 and August 3 were considerably above the 3-year average for the same week, the excess in many instances running as high as 50 percent and occasionally reaching 100 percent. The 25 cities with considerable excess in deaths were Richmond, Norfolk, Washington, Baltimore, Camden, Philadelphia, New York, Springfield, Mass., Rochester, N. Y., Louisville, Cincinnati, Dayton, Columbus, Cleveland, Detroit, Indianapolis, Milwaukee, Chicago, Peoria, St. Paul, Minneapolis, Des Moines, St. Louis, Kansas City, and Los Angeles.

A DIAGNOSIS CODE FOR USE IN TABULATING MORBIDITY STATISTICS

By Thomas Parran, *Surgeon General, United States Public Health Service,* and William L. Austin, *Director, United States Bureau of the Census*

Many nations have agreed upon the International List of Causes of Death as a standard for tabulating and publishing mortality statistics. This list properly gives special attention to the diseases that are the most frequently fatal, but this very fact makes it unsatisfactory for the tabulation of diagnoses for nonfatal illnesses. However, the widespread use of the International List for tabulating deaths makes it essential that it be used as the basis of a list for tabulating morbidity statistics.

Illnesses in hospital and clinic reports and morbidity surveys have thus far been tabulated according to a variety of diagnosis lists; comparison is, therefore, inconvenient if not impossible. There is a definite need for a list of diagnoses suitable for the classification and tabulation of morbidity data. Although several such lists have recently been set up, none that is linked to the last (1938) revision of the International List of Causes of Death has been accompanied by an alphabetical index of diseases to assist in coding illness diagnoses in a uniform way. Without a coding manual of this kind it is impossible for different coders to obtain uniformity in the assignment of specific diagnoses to the categories of the morbidity code.

To meet the need for a uniform tabular list for morbidity statistics that was closely linked to the last revision of the International List of Causes of Death, a committee of consultants was appointed to work with the United States Public Health Service and the Vital Statistics Division of the United States Bureau of the Census in setting up such a suitable diagnosis list. The most active of the consultants and officers were:

Selwyn D. Collins, Ph. D., principal statistician, United States Public Health Service.

Halbert L. Dunn, M. D., Ph. D., chief statistician for vital statistics, United States Bureau of the Census.

Lowell J. Reed, Ph. D., Sc. D., professor of biostatistics and dean, School of Hygiene and Public Health, Johns Hopkins University.

Joseph Berkson, M. D., Sc. D., chief, division of biometry and medical statistics, Mayo Clinic.

Edwin L. Crosby, M. D., Dr. P. H., statistician and supervisor of records, Johns Hopkins Hospital and University.

Theodore A. Janssen, chief of nosology section, division of vital statistics, United States Bureau of the Census.

W. Thurber Fales, Sc. D., director, bureau of vital statistics, Baltimore City Health Department.

The following persons have also cooperated with and furnished helpful advice and material to the committee: Dr. James A. Crabtree,

Dr. Carroll E. Palmer, Dr. W. M. Gafafer, Mrs. Lily V. Welch, and Miss Clara Councell, of the United States Public Health Service; Dr. Helen Jeter, Director of Research, New York Welfare Council; Miss Dorothy Kurtz, Record Librarian, Presbyterian Hospital, New York; Mr. J. T. Marshall, Inspector of Vital Statistics, British Columbia Board of Health.

The diagnosis code which follows has been tentatively agreed upon by the committee as suitable for morbidity tabulations by hospitals and clinics and for sickness surveys to provide a general statement of the frequency of various types of illnesses. Although some classes of diseases, particularly neoplasms, have been shown in considerable detail, it was considered impossible in a list adapted to general use to provide all of the detail that would be desirable in special studies of particular diseases. To make a general list suitable for such studies, it will be found necessary to subdivide the diagnosis categories pertaining to the particular specialty under consideration. There are three ways in which the present list can be expanded. First, the rubrics in this list have been numbered in a way to leave unused numbers at frequent intervals. Second, the code has not employed the symbols X and V which are frequently used to supplement the digits. Third, the code may be expanded by introducing subdivisions of any present code number, to be designated by a letter or decimal.

The number of categories allotted to accidents and poisonings may be larger than the frequency of those conditions justify. However, in coding accidents it seems advisable to take account of both the nature of the injury and the circumstances under which the accident occurred. Thus persons interested in the kind of injury can obtain from this code such data as the number of skull fractures, other simple and compound fractures, joint injuries, lacerations, and superficial injuries with or without regard to the circumstances under which they occurred. Likewise, those interested in the prevention of accidents can obtain data on the circumstances or means of the injury, insofar as that information is available in the original record.

In the three-digit numbering system used for coding purposes, the first two of the three digits designate important or summary categories and the third digit subdivides these into more specific groups. Thus 01 as the first two digits of the code represents a group of common communicable diseases of childhood, while the third digit subdivides these into seven specific diseases. Similarly, 03 represents nonrespiratory tuberculosis, while the third digit separates these cases into tuberculosis of ten specific sites. Of the total of 95 categories in the abridged (2-column) list, 80 are devoted to diseases, 14 to injuries and poisonings, and 1 to conditions without sickness. Of the 527 categories in the detailed (3-column) list, 393 are devoted to

diseases, 130 to injuries and poisonings, and 4 to conditions without sickness. The diagnosis categories shown were selected as: (*a*) Those that occur with considerable frequency in hospital, clinic, and other morbidity data, (*b*) those that could be diagnosed with reasonable accuracy and would thus be codable from the available records, and (*c*) a few categories of small frequency but of general interest from various viewpoints.

The preparation of an alphabetical index of diseases and medical terms with their appropriate code numbers to assist in assigning diagnoses to the categories of the list is under way. In this task also the United States Public Health Service and the Vital Statistics Division of the United States Bureau of the Census are cooperating. The index is to include terms appearing in the Census Bureau's Manual of the International List of Causes of Death, terms collected in a long experience of cross-indexing diagnoses at the Mayo Clinic and the Johns Hopkins Hospital, terms appearing in the Canadian Morbidity Manual, and terms appearing in the Standard Classified Nomenclature of Disease. Terms that appear in more than one of these places will, of course, appear only once in this index. It is necessary to include some ill-defined terms in the index to indicate to the diagnosis coder where the case should be assigned even if it has to go to one of several "waste baskets" of other and ill-defined diseases.

A sickness diagnosis list and manual of this kind will serve in the field of morbidity statistics the function now served in the field of mortality statistics by the International List of Causes of Death and the coding manual prepared by the Vital Statistics Division of the United States Bureau of the Census. It should be emphasized that a morbidity code and manual of this kind will not take the place of or in any way conflict with any nomenclature which may be in use in an institution. The function of a nomenclature is to train the physician to use the clearest and most acceptable diagnostic terms to describe a particular clinical case; the function of this coding manual will be to aid a diagnosis coder in assigning the terms and disease names used by the physician to the proper category in the list for the purpose of statistical tabulations. The better the nomenclature the more accurate will be the assignment of diagnoses for statistical tabulations, but with a complete index to the code, the manual will be usable in connection with any nomenclature. Among those needing such a morbidity diagnosis code as this are hospital service plans which have no control over nomenclature and must accept diagnostic terms from a great variety of hospitals. This code does not attempt to provide enough categories for a detailed diagnosis cross-index, but is designed solely for statistical tabulations.

When the index is completed the code and index will be given a trial of several months in a number of hospitals and in special studies. In

the meantime, suggestions for changes are invited. Revision will be made on the basis of these suggestions and the experience gained in the trials. It is planned to publish the code with the complete index as a Public Health Bulletin. As such it will be available at a nominal price from the Government Printing Office. Inquiries already received from many sources indicate that such a morbidity coding manual will be of immediate value to those working with morbidity statistics.

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS

I. Infectious and Parasitic Diseases

Code Number			*International List Number, 1938 revision* [1]
00		*Typhoid fever and dysentery:*	
	001	Typhoid fever	1
	002	Paratyphoid fever	2
	007	Bacillary dysentery	27a
	008	Amebic dysentery	27b
	009	Other forms of dysentery	27c
01		*Common communicable diseases of childhood:*	
	010	Scarlet fever	8
	011	Whooping cough	9
	012	Diphtheria	10
	013	Measles	35
	014	German measles	38d
	015	Chickenpox	38e
	016	Mumps	44c
02		*Tuberculosis of the respiratory system:*	
	020	Tuberculosis of the respiratory system, with occupational disease of the lungs	13a
	029	Other tuberculosis of the respiratory system	13b, c
03		*Other forms of tuberculosis:*	
	030	Tuberculosis of the meninges and central nervous system	14
	031	Tuberculosis of the intestines and peritoneum	15
	032	Tuberculosis of the vertebral column	16
	033	Tuberculosis of other bones and joints	17
	034	Tuberculosis of the skin	18
	035	Tuberculosis of the lymphatic system (except bronchial, mediastinal, mesenteric, and retroperitoneal lymph nodes)	19
	036	Tuberculosis of the genito-urinary system	20
	037	Acute miliary tuberculosis	22a
	039	Other forms of tuberculosis	21, 22b
04		*Gonococcus infection:*	
	040	Gonococcus infection of the female genito-urinary system	25
	041	Gonococcus infection of the male genito-urinary system	25
	042	Gonococcus infection of the joints	25
	043	Gonococcus infection of the eye	25
	044	Gonococcus infection of the heart	25
	049	Other forms of gonococcus infection	25

[1] For the International List titles and inclusions see Manual of the International List of Causes of Death (based on 1938 Paris revision), prepared by the U S Bureau of the Census, Government Printing Office, 1940.

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

I. Infectious and Parasitic Diseases—Continued

Code Number			International List Number, 1938 revision
05		*Malaria:*	
	050	Malignant tertian malaria	28c
	051	Quartan malaria	28b
	052	Benign tertian malaria	28a
	059	Other forms of malaria	28d
06		*Syphilis:*	
	060	Early syphilis	pt. 30g
	061	Late vascular syphilis	30d, e
	062	Tabes dorsalis	30a
	063	General paresis	30b
	064	Other forms of late syphilis of the central nervous system	30c
	065	Other forms of late syphilis	pt. 30g
	066	Congenital syphilis	30f
	067	Syphilis, serology positive (only finding)	pt. 30g
	069	Other forms of syphilis	pt. 30g
07, 08, 09		*Other infectious and parasitic diseases:*	
	070	Undulant fever (brucellosis)	5
	071	Cerebrospinal (meningococcus) meningitis	6
	072	Erysipelas	11
	073	Tetanus	12
	074	Septicemia	24a, b, d
	075	Gas bacillus infection	24c
	076	Tularaemia	26a
	080	Smallpox	34
	081	Acute poliomyelitis	36
	082	Acute infectious encephalitis (lethargic)	38
	083	Herpes zoster	38c
	084	Typhus fever	39a, b, d
	085	Rocky Mountain spotted fever	39c
	090	Ankylostomiasis	40
	091	Actinomycosis	43
	092	Dermatophytosis	43
	093	Other forms of mycosis infection	43
	094	Chancroid	44a
	095	Other forms of venereal disease (except syphilis and gonorrhea)	44a
	096	Lymphogranulomatosis	44b
	099	Other infectious and parasitic diseases	3, 4, 7, 23, 26b, 29, 31, 32, 38a, b, f, 41, 42, 44d

II. Neoplasms

10		*Malignant neoplasm of the buccal cavity and pharynx:*	
	100	Malignant neoplasm of the lip	45a
	101	Malignant neoplasm of the tongue	45b
	102	Malignant neoplasm of the salivary glands	pt. 45e
	109	Malignant neoplasm of the pharynx and other parts of the buccal cavity	pt. 45e, 45c, f

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

II. Neoplasms - Continued

Code Number		International List Number, 1938 revision
11	*Malignant neoplasm of the digestive organs:*	
110	Malignant neoplasm of the esophagus	46a
111	Malignant neoplasm of the stomach	46b
112	Malignant neoplasm of the small intestine	46c, pt. 46e
113	Malignant neoplasm of the large intestine (except rectum)	pt. 46e
114	Malignant neoplasm of the rectum	pt 46d
115	Malignant neoplasm of the pancreas	46g
119	Malignant neoplasm of other digestive organs	46f, h, m
12	*Malignant neoplasm of the respiratory system:*	
120	Malignant neoplasm of the larynx	47a
121	Malignant neoplasm of the bronchus, lung, and pleura	47c, d, e
129	Malignant neoplasm of other parts of the respiratory system	47b, f
13	*Malignant neoplasm of the female genital organs and breast:*	
130	Malignant neoplasm of the cervix uteri	48a
131	Malignant neoplasm of the uterus (except cervix)	48b
132	Malignant neoplasm of the ovary	49a
138	Malignant neoplasm of other female genital organs	49b, c, e
139	Malignant neoplasm of the female breast	pt. 50
14	*Malignant neoplasm of the male genital organs:*	
140	Malignant neoplasm of the prostate	51b
141	Malignant neoplasm of the testis	51c
149	Malignant neoplasm of other male genital organs	51d, e
15, 16	*Other malignant neoplasms:*	
150	Malignant neoplasm of the kidney and adrenal gland	52a, 55a
151	Malignant neoplasm of the bladder	52b
152	Malignant neoplasm of other organs of the urinary system	52c
153	Malignant neoplasm of the skin of the neck, face, and hands	pt. 53
154	Malignant neoplasm of the skin of other sites	pt. 46d, 49d, 51a, pt. 53
157	Malignant neoplasm of the pituitary	
158	Malignant neoplasm of the brain	54, 57d
159	Malignant neoplasm of the spinal cord	
160	Malignant neoplasm of the bone	45d, 55b
161	Malignant neoplasm of the nasal cavity and accessory sinuses	55d
162	Malignant melanoma	
163	Generalized lymphosarcoma	pt. 50, 55c, e
164	Other forms of generalized malignant neoplasm	
169	Other malignant neoplasms	
17	*Nonmalignant neoplasm of the female genital organs and breast:*	
170	Fibroma of the uterus	pt. 56b
171	Endometrioma	pt. 56c
172	Polyps of the female genital organs	
178	Other nonmalignant neoplasms of the female genital organs	56a, pt. 56b, pt. 56c, 57a, 57b, pt. 57c
179	Nonmalignant neoplasm of the female breast	pt. 56c, pt. 57c
18, 19	*Other nonmalignant neoplasms:*	
180	Nonmalignant neoplasm of the pituitary	
181	Nonmalignant neoplasm of the brain	56d
182	Nonmalignant neoplasm of the spinal cord	

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

II. Neoplasms—Continued

Code Number			International List Number, 1938 revision
		Other nonmalignant neoplasms—Continued.	
	183	Nonmalignant neoplasm of the digestive organs	pt. 56e, pt. 57e
	184	Polyp of the nasal cavity and accessory sinuses	pt. 56e
	185	Other nonmalignant neoplasm of the respiratory system	pt. 56e, pt. 57e
	186	Nonmalignant neoplasm of the skin	
	187	Nonmalignant neoplasm of the bone	
	190	Pilonidal cyst	pt. 123
	191	Lipoma	pt. 56e
	192	Hemangioma and lymphangioma	
	199	Other nonmalignant neoplasms	pt. 56e, 57e

III. Rheumatic Fever, Diseases of Nutrition and of the Endocrine Glands, Other General Diseases and Avitaminoses

20		*Acute rheumatic fever:*	
	200	Acute rheumatic heart disease	58a, b, c, d
	201	Acute rheumatic fever without heart involvement	58e
	202	Rheumatic chorea	
21		*Diabetes mellitus:*	
	210	Diabetes mellitus with infection or gangrene	61
	211	Diabetes mellitus with acidosis or coma	
	219	Other diabetes mellitus	
22		*Goiter:*	
	220	Toxic nodular goiter	63a, b
	221	Nontoxic nodular goiter	
	222	Exophthalmic goiter	
	229	Other forms of goiter	
23		*Other diseases of the endocrine glands:*	
	230	Myxedema and cretinism	63c
	231	Hypoparathyroidism	pt. 63e
	232	Other diseases of the thyroid and parathyroid	63d, pt. 63e
	233	Diseases of the pituitary	62
	234	Addison's disease	pt. 21a, 65a
	235	Ovarian dysfunction	pt. 66b
	239	Other diseases of the endocrine glands	64, pt. 66b
24		*Other nutritional and general diseases:*	
	240	Gout	60
	241	Obesity	pt. 66b
	242	Malnutrition	
	245	Other general diseases	66a, pt. 66b
	247	Pellagra	69
	248	Rickets	70
	249	Other avitaminoses	67, 68, 71

IV. Diseases of the Blood and Blood Forming Organs

25		*Anemia:*	
	250	Pernicious anemia	73a
	251	Secondary anemia	pt. 73c, d
	259	Other forms of anemia	73b, pt. 73c, d

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

IV. Diseases of the Blood and Blood Forming Organs—Continued

Code Number			International List Number, 1938 revision
26		*Other diseases of the blood and blood forming organs:*	
	260	Primary purpuras	72a
	261	Hemophilia	72b
	262	Leukemias and aleukemias	74
	263	Diseases of the spleen	75
	264	Agranulocytosis	76a
	269	Other diseases of the blood and blood forming organs	72c, 76b, c, d

V. Chronic Poisoning and Intoxication

27		*Chronic poisoning and intoxication:*	
	270	Alcoholism	77
	273	Occupational lead poisoning	78a
	274	Other lead poisoning	78b
	275	Occupational poisoning by other substances	79a
	278	Drug addiction	79b
	279	Other chronic poisoning	

VI. Diseases of the Nervous System and Sense Organs

28		*Inflammatory diseases of the central nervous system:*	
	280	Intracranial abscess	80a
	281	Encephalitis, except acute infectious	80b
	282	Meningitis, except meningococcus	81
29		*Degenerative diseases of the spinal cord:*	
	290	Amyotrophic lateral sclerosis	pt. 82
	291	Progressive muscular atrophy	
	292	Progressive muscular dystrophy	
	293	Multiple sclerosis	87d
30		*Diseases of the cranial nerves:*	
	300	Facial paralysis	pt. 87b
	301	Trigeminal neuralgia	
	309	Other diseases of the cranial nerves	
31		*Intracranial lesions of vascular origin:*	
	310	Acute intracranial lesion of vascular origin	83a, b, c
	319	Residuals of intracranial lesions of vascular origin	83d
32		*Mental deficiency and psychiatric diseases:*	
	320	Mental deficiency	84a
	323	Schizophrenia	84b
	324	Manic-depressive psychosis	84c
	325	Neurasthenia	84d
	326	Other minor psychoses	
	329	Other psychiatric diseases	
33		*Other diseases of the nervous system:*	
	330	Paralysis agitans except result of encephalitis	87c
	331	Migraine	pt. 87e
	332	Epilepsy	85
	335	Other diseases of the central nervous system	pt. 82, 87a, pt. 87e
	337	Diseases of the peripheral nerves	pt. 87e
	339	Other diseases of the nervous system	86, pt. 87e

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

VI. Diseases of the Nervous System and Sense Organs—Continued

<table>
<tr><th colspan="2">Code Number</th><th></th><th>International List Number, 1938 revision</th></tr>
<tr><td>34</td><td></td><td>Diseases of the organs of vision:</td><td></td></tr>
<tr><td></td><td>340</td><td>Glaucoma</td><td rowspan="9">88</td></tr>
<tr><td></td><td>341</td><td>Cataract</td></tr>
<tr><td></td><td>342</td><td>Strabismus</td></tr>
<tr><td></td><td>343</td><td>Errors of refraction</td></tr>
<tr><td></td><td>344</td><td>Detachment of the retina</td></tr>
<tr><td></td><td>345</td><td>Trachoma</td></tr>
<tr><td></td><td>346</td><td>Ulcer of the cornea</td></tr>
<tr><td></td><td>347</td><td>Inflammatory diseases of the eye and eyelid</td></tr>
<tr><td></td><td>349</td><td>Other diseases of the organs of vision</td></tr>
<tr><td>35</td><td></td><td>Diseases of the ear and mastoid process:</td><td></td></tr>
<tr><td></td><td>350</td><td>Otitis media</td><td rowspan="5">89a</td></tr>
<tr><td></td><td>351</td><td>Other inflammatory diseases of the ear</td></tr>
<tr><td></td><td>352</td><td>Deafness</td></tr>
<tr><td></td><td>353</td><td>Meniere's disease</td></tr>
<tr><td></td><td>357</td><td>Other diseases of the ear</td></tr>
<tr><td></td><td>359</td><td>Diseases of the mastoid process</td><td>89b</td></tr>
</table>

VII. Diseases of the Circulatory System

<table>
<tr><td>36</td><td></td><td>Chronic rheumatic heart disease:</td><td></td></tr>
<tr><td></td><td>360</td><td>Diseases of the mitral valve</td><td>92b</td></tr>
<tr><td></td><td>365</td><td>Other chronic rheumatic heart disease</td><td>90a, 92c, 93c, 95b</td></tr>
<tr><td>37</td><td></td><td>Hypertensive cardiovascular disease:</td><td></td></tr>
<tr><td></td><td>370</td><td>Hypertensive cardiovascular disease</td><td>pt. 93</td></tr>
<tr><td></td><td>375</td><td>Hypertensive cardiovascular-renal disease</td><td>pt. 131a</td></tr>
<tr><td>38</td><td></td><td>Other diseases of the heart:</td><td></td></tr>
<tr><td></td><td>380</td><td>Subacute bacterial endocarditis</td><td>pt. 91a</td></tr>
<tr><td></td><td>382</td><td>Diseases of the coronary arteries and angina pectoris</td><td>94</td></tr>
<tr><td></td><td>388</td><td>Functional diseases of the heart</td><td>95a</td></tr>
<tr><td></td><td>389</td><td>Other diseases of the heart</td><td>90b, pt. 91a, 91b, c, 92a, d, e, pt. 93, 95c</td></tr>
<tr><td>39</td><td></td><td>Hypertensive vascular disease:</td><td></td></tr>
<tr><td></td><td>390</td><td>Hypertensive vascular disease with arteriosclerosis</td><td rowspan="2">102</td></tr>
<tr><td></td><td>399</td><td>Other hypertensive vascular disease</td></tr>
<tr><td>40</td><td></td><td>Other diseases of the arteries:</td><td></td></tr>
<tr><td></td><td>400</td><td>Arteriosclerosis</td><td>97</td></tr>
<tr><td></td><td>401</td><td>Vascular aneurysm (except of the aorta)</td><td>96</td></tr>
<tr><td></td><td>402</td><td>Raynaud's disease</td><td rowspan="3">99</td></tr>
<tr><td></td><td>403</td><td>Thrombo-angiitis obliterans</td></tr>
<tr><td></td><td>409</td><td>Other diseases of the arteries</td></tr>
<tr><td>41</td><td></td><td>Varicose veins and hemorrhoids:</td><td></td></tr>
<tr><td></td><td>410</td><td>Varicose veins of the lower extremities</td><td rowspan="2">100a</td></tr>
<tr><td></td><td>414</td><td>Varicose veins of other sites</td></tr>
<tr><td></td><td>415</td><td>Hemorrhoids</td><td>pt. 100b</td></tr>
<tr><td>42</td><td></td><td>Other diseases of the circulatory system:</td><td></td></tr>
<tr><td></td><td>420</td><td>Phlebitis and thrombophlebitis of the lower extremities</td><td rowspan="3">pt. 100b</td></tr>
<tr><td></td><td>421</td><td>Phlebitis and thrombophlebitis of other sites</td></tr>
<tr><td></td><td>424</td><td>Other diseases of the veins</td></tr>
<tr><td></td><td>426</td><td>Lymphadenitis and lymphangitis</td><td>101</td></tr>
<tr><td></td><td>429</td><td>Other diseases of the circulatory system</td><td>98, 103</td></tr>
</table>

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

VIII. Diseases of the Respiratory System

Code Number			International List Number, 1938 revision
43		*Influenza:*	
	430	Influenza	33
44		*Acute nasopharyngitis:*	
	440	Acute nasopharyngitis	pt. 104a, pt. 115c
45		*Tonsillitis with tonsillectomy:*	
	450	Tonsillitis with tonsillectomy	pt. 115c
46		*Diseases of the pharynx and larynx:*	
	460	Tonsillitis without tonsillectomy	pt. 115c
	461	Septic sore throat	115b
	466	Other diseases of the pharynx	pt. 115c
	467	Laryngitis	105
	469	Other diseases of the larynx	
47		*Bronchitis:*	
	471	Chronic bronchitis	106b
	479	Other forms of bronchitis	106a, c
48		*Pneumonia:*	
	480	Secondary pneumonia	107–109
	489	Other pneumonia	
49, 50		*Other diseases of the respiratory system:*	
	490	Empyema	110a
	492	Pleurisy with effusion	110b
	493	Other pleurisy	
	495	Sinusitis	104b
	496	Deflected nasal septum	pt. 104a
	499	Other diseases of the nasal fossae	
	500	Allergic rhinitis (hay fever)	112
	501	Asthma	
	503	Pulmonary embolism and infarction	111a
	504	Pulmonary emphysema	113
	505	Silicosis	114a
	506	Other pneumoconiosis	114b
	507	Abscess of the lung	114d
	509	Other diseases of the respiratory system	111b, c, 114c, e

IX. Diseases of the Digestive System

1		*Diseases of the buccal cavity and esophagus:*	
	510	Infected or impacted teeth	115a
	514	Diseases of the salivary glands	115d
	517	Other diseases of the buccal cavity and annexa	
	519	Diseases of the esophagus	116
52		*Ulcer of the stomach and intestine:*	
	520	Acute perforating ulcer of the stomach	117a
	523	Other ulcer of the stomach	
	525	Acute perforating ulcer of the duodenum	117b
	527	Other ulcer of the duodenum	
	529	Ulcer of the intestine (except duodenum)	pt. 119b, pt. 120b
53		*Diarrhea and enteritis:*	
	530	Ulcerative colitis	119–120
	539	Other diarrhea and enteritis	

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

IX. Diseases of the Digestive System—Continued

Code Number			International List Number, 1938 revision
54		*Appendicitis:*	
	540	Appendicitis with perforation	121
	549	Other appendicitis	
55		*Hernia:*	
	550	Inguinal hernia	122a
	551	Femoral hernia	
	552	Ventral hernia	
	553	Umbilical hernia	
	554	Diaphragmatic hernia	
	559	Other intestinal hernia	
56		*Functional digestive disturbances:*	
	560	Functional digestive disturbances	pt. 118, pt. 123
57		*Other diseases of the stomach and intestines:*	
	570	Cardiospasm	pt. 118
	572	Intestinal obstruction	122b
	574	Diseases of the anus and rectum	pt. 123
	579	Other diseases of the stomach and intestines	
58		*Diseases of the liver and gallbladder:*	
	580	Cirrhosis of the liver	124
	583	Acute yellow atrophy of the liver	125a
	584	Other diseases of the liver	125b
	585	Biliary calculi	126
	586	Cholecystitis without biliary calculi	127a
	587	Catarrhal jaundice	127b
	589	Other diseases of the gallbladder and biliary ducts	
59		*Other diseases of the digestive system:*	
	590	Diseases of the pancreas	128
	593	Peritoneal adhesions	129
	595	Peritonitis	
	599	Other diseases of the digestive system	pt. 118, pt. 123

X. Diseases of the Genito-Urinary System

Code Number			International List Number, 1938 revision
60		*Nephritis:*	
	600	Nephritis	130, 131b, 132
	607	Hypertensive vascular renal disease	pt. 131a
61		*Other diseases of the kidneys and ureters:*	
	610	Pyelitis, pyelonephritis, and pyelocystitis	133a
	612	Hydronephrosis	133b
	617	Other diseases of the kidneys and ureters	
	619	Calculi of the kidney and ureter	134a
62		*Other diseases of the urinary system:*	
	620	Calculi of other parts of the urinary passages	134b, c
	621	Cystitis	135a
	623	Other diseases of the bladder	pt. 135b
	624	Stricture of the urethra	136a
	626	Other diseases of the urethra	pt. 136b
	629	Other diseases of the urinary system	pt. 135b, pt. 136b

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

X. Diseases of the Genito-Urinary System—Continued

Code Number			*International List Number, 1938 revision*
63		*Diseases of the prostate:*	
	630	Hypertrophy of the prostate	137a
	631	Calculus of the prostate	
	632	Prostatitis	137b
	639	Other diseases of the prostate	
64		*Other diseases of the male genital organs:*	
	640	Hydrocele	
	642	Circumcision	pt. 138
	644	Orchitis and epididymitis	
	649	Other diseases of the male genital organs	
65, 66		*Diseases of the female genital organs and breast:*	
	650	Diseases of the ovaries, fallopian tubes, and parametrium	
	652	Cervicitis	
	654	Other diseases of the uterus	pt. 139
	656	Vaginitis and vulvitis	
	658	Multiple pelvic diseases of the female	
	660	Cystocele and rectocele of the female	pt. 123, pt. 135b
	661	Malposition of the female genital organs	
	663	Menopause	
	664	Menstrual disorders	pt. 139
	667	Other diseases of the female genital organs	
	668	Mastitis	
	669	Other diseases of the female breast	

XI. Deliveries and Complications of Pregnancy, Childbirth, and the Puerperium

67		*Delivery with live or stillbirth:*	
	670	Spontaneous full term delivery with live birth	
	671	Operative full term delivery with live birth	
	672	Spontaneous premature delivery with live birth	
	673	Operative premature delivery with live birth	pt. 149,
	674	Spontaneous full term delivery with stillbirth	pt. 150
	675	Operative full term delivery with stillbirth	
	676	Spontaneous premature delivery with stillbirth	
	677	Operative premature delivery with stillbirth	
68		*Toxemia, hemorrhage, and infection of pregnancy, childbirth, and the puerperium:*	
	680	Toxemias of pregnancy	pt. 141, 142, 144, 148
	682	Placenta praevia	
	683	Premature separation of placenta	pt. 141,
	684	Postpartum hemorrhage	pt. 142,
	685	Other hemorrhage of pregnancy, childbirth, and the puerperium	143.146
	686	Pyelitis and pyelonephritis of pregnancy, childbirth, and the puerperium	pt. 140,
	687	Phlebitis of pregnancy, childbirth, and the puerperium	pt. 142, pt. 145,
	689	Other infections of pregnancy, childbirth, and the puerperium	147
69		*Other complications of pregnancy, childbirth, and the puerperium:*	
	690	Infection of the breast during lactation	150a
	691	Psychosis of the puerperium	150b

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

XI. Deliveries and Complications of Pregnancy, Childbirth, and the Puerperium—Continued

Code Number			International List Number, 1938 revision
		Other complications of pregnancy, childbirth, and the puerperium—Continued.	
	692	Contracted pelvis	pt. 149
	693	Trauma of childbirth	
	694	Abortion	pt. 140, pt. 141
	695	Ectopic pregnancy	pt. 142
	696	Multiple pregnancy	pt. 149
	698	Other complications of pregnancy	pt. 145
	699	Other complications of childbirth and the puerperium	pt. 149, pt. 150

XII. Diseases of the Skin

Code Number			International List Number, 1938 revision
70, 71		*Diseases of the skin:*	
	700	Furuncle and carbuncle	151
	702	Cellulitis	
	704	Paronychia	pt. 152
	709	Other local infections	
	710	Eczema	
	711	Impetigo	
	712	Scabies	
	713	Pediculosis	
	714	Urticaria	
	715	Psoriasis	153
	716	Pemphigus	
	717	Dermatitis of occupational origin	
	718	Dermatitis venenata	
	719	Other diseases of the skin	

XIII. Diseases of the Bones and Organs of Movement

Code Number			International List Number, 1938 revision
72		*Arthritis:*	
	720	Chronic infectious arthritis	59a
	724	Osteoarthritis	59b
	729	Other forms of arthritis	pt. 156
73		*Other diseases of the bones and joints:*	
	730	Osteomyelitis	pt. 154
	731	Osteitis deformans	pt. 154, 155
	733	Old fracture	
	734	Other diseases of the bones	
	735	Curvature of the spine	
	736	Sacroiliac disease	pt. 156
	737	Bursitis and synovitis	
	739	Other diseases of the joints	
74		*Other diseases of the organs of movement:*	
	740	Torticollis	
	742	Deformities due to previous illness or injury	
	744	Ganglion	pt. 156
	746	Flatfoot	
	749	Other diseases of the organs of movement	

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

XIV. Congenital Malformations

Code Number			International List Number, 1938 revision
75, 76		*Congenital malformations:*	
	750	Spina bifida	157a, b, c, d
	752	Other congenital malformations of the central nervous system	
	753	Congenital malformations of the heart	157e
	754	Congenital malformations of other parts of the cardio-vascular system	157f
	756	Harelip and cleft palate	157g
	759	Other congenital malformations of the digestive system	
	760	Undescended testicle	
	761	Hypospadias and epispadias	157h
	763	Other congenital malformations of the genito-urinary system	
	765	Congenital dislocation of the hip	
	766	Other congenital malformations of the bones and joints	157m
	769	Other congenital malformations	

XV. Diseases Peculiar to the First Year of Life

77		*Diseases peculiar to the first year of life:*	
	770	Prematurity	159
	771	Intracranial injury at birth	160a, b
	773	Other injury at birth	160c
	775	Infections of the newborn	161b
	777	Feeding problems	pt. 158
	779	Other diseases peculiar to the first year of life	pt. 158, 161a, c

XVI, XVIII. Senility and Other and Ill-Defined Diseases

78		*Senility and ill-defined diseases:*	
	780	Senility with psychosis	162a
	781	Other senility	162b
	783	Rheumatism (except rheumatic fever)	58f, 59c
	784	Neuralgia and myalgia	pt. 87b, pt. 156b
	785	Headache (except migraine)	pt. 200
	789	Other ill-defined diseases	199 pt. 200
79		*All other diseases:*	
	790	Reaction from prophylatic inoculation	
	791	Serum-sickness from therapeutic inoculation	pt. 200
	793	Other allergic manifestations	
	799	Other diseases.	

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

XVII. Injuries and Poisonings

Code Number			International List Number, 1938 revision
84		*Acute accidental poisoning by drugs commonly injected or taken orally:*	
	840	Accidental poisoning by alkaloids	
	841	Accidental poisoning by barbiturates	
	842	Accidental poisoning by bromides	
	843	Accidental poisoning by other sedative drugs	
	844	Accidental poisoning by arsenicals	
	845	Accidental poisoning by digitalis	pt. 179
	846	Accidental poisoning by sulfanilamide and related drugs	
	847	Accidental poisoning by strychnine	
	848	Accidental poisoning by aspirin and other salicylates	
	849	Accidental poisoning by other nonsedative drugs commonly injected or taken orally	
85		*Acute accidental poisoning by chemicals not commonly injected or taken orally:*	
	850	Accidental poisoning by bichloride and other mercury compounds	
	851	Accidental poisoning by lye and other caustic alkalies	
	852	Accidental poisoning by alcohol (except ethyl)	
	853	Accidental poisoning by carbolic acid and other cresol compounds	
	854	Accidental poisoning by silver compounds	pt. 179
	855	Accidental poisoning by kerosene, gasolene, benzol	
	856	Accidental poisoning by iodine	
	857	Accidental poisoning by oil of wintergreen	
	859	Accidental poisoning by other toxic substances not commonly injected or taken orally	
86		*Other acute poisoning:*	
	860	Food poisoning from bacterial toxins	
	861	Other food poisoning	177
	862	Accidental poisoning by illuminating gas	
	863	Accidental poisoning by motor-vehicle exhaust gas	pt. 178
	864	Accidental poisoning by other toxic substances	pt. 175b, pt. 178, pt. 179, 194
	865	Nonaccidental poisoning by gas	pt. 163, pt. 168, pt. 196–198
	866	Nonaccidental poisoning by bichloride and other mercury compounds	
	867	Nonaccidental poisoning by carbolic acid and other cresol compounds	pt. 163, pt. 168
	868	Nonaccidental poisoning by strychnine	
	869	Nonaccidental poisoning by other toxic substances	
87		*General effects of external causes:*	
	871	Heat prostration	191
	872	Effects of cold (low temperature)	190
	873	Effects of mechanical suffocation	182
	874	Effects of electric shock and lightning	192, 193
	875	Effects of hunger or thirst	189
	878	Effects of accidental submersion (drowning)	183
	879	Effects of nonaccidental submersion (drowning)	164b, pt. 168

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

XVII. Injuries and Poisonings—Continued

Code Number			International List Number, 1938 revision
88		*Injury by foreign body or firearms:*	
	881	Foreign body in eye	
	882	Foreign body in ear or nose	
	883	Foreign body in bronchus or lung	195d
	884	Foreign body in digestive tract	pt. 195e
	886	Foreign body in other locations	
	888	Accidental injury by firearms	184
	889	Nonaccidental injury by firearms	pt. 164c, 166, pt. 196–198
89		*Burn or scald:*	
	890	Burn in motor-vehicle accident	pt. 170
	891	Burn in other transportation accident	pt. 169, pt. 171–173
	892	Burn by hot liquids	180, 181
	893	Burn by fire or hot objects	
	895	Sunburn	
	898	Other accidental burn	
	899	Nonaccidental burn	pt. 164g, pt. 168, 196, 197
90		*Fracture of the skull:*	
	900	Fracture of skull in motor-vehicle accident	
	901	Fracture of skull in other transportation accident	
	902	Fracture of skull in machinery accident	
	903	Fracture of skull in sports or recreation	
	904	Fracture of skull by handling objects or hand tools	
	905	Fracture of skull from striking against an object	
	906	Fracture of skull from being struck by a falling object	
	907	Fracture of skull from fall	
	908	Fracture of skull in other accident	
	909	Nonaccidental fracture of skull	
91		*Simple fracture, except of the skull:*	
	910	Simple fracture in motor-vehicle accident	
	911	Simple fracture in other transportation accident	
	912	Simple fracture in machinery accident	[2] pt. 169–
	913	Simple fracture in sports or recreation	176
	914	Simple fracture by handling objects or hand tools	pt. 185–
	915	Simple fracture from striking or stepping on an object	188
	916	Simple fracture from being struck by a falling object	pt. 195–
	917	Simple fracture from fall	198
	918	Simple fracture in other accident	
	919	Nonaccidental simple fracture	
92		*Compound fracture, except of the skull:*	
	920	Compound fracture in motor-vehicle accident	
	921	Compound fracture in other transportation accident	
	922	Compound fracture in machinery accident	
	923	Compound fracture in sports or recreation	
	924	Compound fracture by handling objects or hand tools	
	925	Compound fracture from striking or stepping on an object	
	926	Compound fracture from being struck by a falling object	
	927	Compound fracture from fall	
	928	Compound fracture in other accident	
	929	Nonaccidental compound fracture	

See footnote on p. 1574.

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

XVII. Injuries and Poisonings—Continued

Code Number		*International List Number, 1938 revision*
93	*Dislocation, sprain, or other joint injury without fracture:*	
930	Joint injury in motor-vehicle accident	
931	Joint injury in other transportation accident	
932	Joint injury in machinery accident	
933	Joint injury in sports and recreation	
934	Joint injury by handling objects or hand tools	
935	Joint injury from striking or stepping on an object	
936	Joint injury from being struck by a falling object	
937	Joint injury from fall	
938	Joint injury in other accident	
939	Nonaccidental joint injury	
94	*Concussion of the brain without fracture of the skull:*	
940	Concussion of the brain in motor-vehicle accident	
941	Concussion of the brain in other transportation accident	
942	Concussion of the brain in machinery accident	
943	Concussion of the brain in sports or recreation	
944	Concussion of the brain by handling objects or hand tools	
945	Concussion of the brain from striking against an object	
946	Concussion of the brain from being struck by a falling object	[2]pt. 169–176
947	Concussion of the brain from fall	pt. 185–188
948	Concussion of the brain in other accident	
949	Nonaccidental concussion of the brain	pt. 195–198
95	*Cut, laceration, or puncture wound:*	
950	Laceration in motor-vehicle accident	
951	Laceration in other transportation accident	
952	Laceration in machinery accident	
953	Laceration in sports or recreation	
954	Laceration by handling objects or hand tools	
955	Laceration from striking or stepping on an object	
956	Laceration from being struck by a falling object	
957	Laceration from fall	
958	Laceration in other accident	
959	Nonaccidental laceration	
96	*Abrasion, contusion, or other superficial injury:*	
960	Superficial injury in motor-vehicle accident	
961	Superficial injury in other transportation accident	
962	Superficial injury in machinery accident	
963	Superficial injury in sports or recreation	
964	Superficial injury by handling objects or hand tools	
965	Superficial injury from striking or stepping on an object	
966	Superficial injury from being struck by a falling object	
967	Superficial injury from fall	

[2] For the categories for certain types of injuries (90–97 in terms of the summary 2-digit morbidity code), the equivalent International List numbers are:
Third digit=0=Part of I. L. 170
Third digit=1=Parts of I. L. 169, 171–173
Third digit=2=Parts of I. L. 174, 175a, 175d, 176
Third digit=3–6=Part of I. L. 195 (for summary 2-digit morbidity code 95, third digit codes 3–6 would be equivalent to 185 in many instances)
Third digit=7=I. L. 186a
Third digit=8=Parts of other I. L. numbers 169–195
Third digit=9=Parts of I. L. 164–168, 196–198.

LIST OF DIAGNOSIS CATEGORIES FOR MORBIDITY TABULATIONS—Con.

XVII. Injuries and Poisonings—Continued

Code Number		*Abrasion, contusion, or other superficial injury*—Continued.	International List Number, 1938 revision
	968	Superficial injury in other accident	
	969	Nonaccidental superficial injury	
97		*Other injury:*	
	970	Other injury in motor-vehicle accident	pt. 169–176, pt. 185–188, pt. 195–198
	971	Other injury in other transportation accident	
	972	Other injury in machinery accident	
	973	Other injury in sports or recreation	
	974	Other injury by handling objects or hand tools	
	975	Other injury from striking or stepping on an object	
	976	Other injury from being struck by a falling object	
	977	Other injury from fall	
	978	Other injury in other accident	
	979	Nonaccidental other injury	

XIX. Other Enumerated Conditions, Without Sickness

99		*Other enumerated conditions, without sickness:*	
	990	Medical examination, negative findings	None
	991	Post-operative check up, negative findings	
	992	Infectious disease carrier without sickness	
	993	Prophylactic inoculation without sickness	

THE DISTRIBUTION OF SELENIUM IN PLASMA AND LIVER PROTEINS AND ITS FRACTIONATION IN TRYPTIC LIVER DIGESTS [1]

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Previous work from this laboratory has shown that continual ingestion of selenium occurring naturally in certain cereals results in considerable storage of selenium in the tissues of the body, apparently for the most part in combination with the tissue proteins (*1*). The chemical nature of the selenium in such combination is not known. Under suitable conditions considerable amounts of selenium can be split off from tissue proteins with bromine in hydrobromic acid at room temperature (*1*). In like manner, selenium is removable almost quantitatively from grain proteins with either bromine in hydrobromic acid or hydrogen peroxide (*2*). This, however, gives little clue as to its chemical nature for it appears probable that with these procedures the selenium separates out as a degradation inorganic product.

More recently it has been observed in this laboratory that the toxicity of naturally occurring food selenium is related in an interesting

[1] From the Division of Pharmacology, National Institute of Health.

manner to the dietary proteins (*3*). It has been found that within certain limits the toxicity of food selenium is correlated not so much with the level of intake as with the protein-selenium ratio of the diet. A given level of intake which is highly toxic when fed as part of a low-protein diet may have scarcely any demonstrable effect when fed in a suitably constituted high-protein diet. This, with the accumulating evidence that the relationship applies to ingested inorganic selenium (unpublished data and (*4*, *5*, *6*)) as well, raises many questions. The mechanism of the protective influence is not completely understood at present, and it seemed probable that further knowledge of the metabolism of selenium in the body tissues might give information of value in solving this problem.

These considerations led us to undertake experiments in order to ascertain more definitely the manner of distribution of selenium in, and association with, the known tissue proteins. Experiments are also described which were designed to release the selenium compound or compounds from the proteins, with attempts to characterize the material so obtained insofar as it might be related in its properties to some of the amino acids.

EXPERIMENTAL

All the selenium-bearing tissues used in this work were obtained, with one exception (rats D37, table 6), from rabbits which had been fed for several months on selenized oats or selenized wheat as previously described (*7*). The animals were bled from the carotid artery under ether anesthesia as completely as possible and the oxalated plasma was separated by centrifugation. The livers were removed at once, in a few instances after brief perfusion with normal saline, weighed, ground in a mortar, and extracted with 5 percent solution of $MgSO_4$, or digested in a suitable medium as described below. In two experiments (68 and 110, table 3) the livers were frozen with liquid air immediately upon removal.

The digestion experiments were carried out for 20 to 24 hours at 38° C. with the finely divided liver, usually weighing 50–60 gm., suspended in about 200 cc. of water containing 1 gm. of trypsin in solution made slightly alkaline with Na_2CO_3 to pH 7.4–8.0. One or 2 cc. of toluene were used as a preservative. In the few instances in which peptic digestion was tried, a similar procedure was used, with 1 gm. of pepsin in dilute HCl adjusted to pH 2.0–2.4. At the end of the digestion period acetic acid (or sodium acetate) was added to pH 4.0 and sufficient trichloracetic acid to make a 10 percent solution. The protein-free solution was then separated from the undigested residue by filtration and washing. The selenium content of the various fractions was determined by the method previously described (*8*).

SELENIUM IN THE PLASMA PROTEINS

The plasma proteins were separated by Howe's method into fibrinogen, euglobulin, pseudoglobulin I, pseudoglobulin II, and albumin (*9*). The selenium in the filtrate from the last fraction was considered as nonprotein. The results of four such experiments are shown in table 1. If we consider the three globulin fractions, euglobulin and pseudoglobulin I and II, under one head as combined globulins it appears that the plasma selenium distributes itself more or less evenly among the three major proteins, fibrinogen, combined globulins, and albumin. The nonprotein selenium, in agreement with previous experiments (*1*), is slight. On the assumption that the fibrinogen nitrogen in the plasma has a normal value and is but a small fraction of the other nitrogenous constituents, it would appear that selenium has a greater though not an exclusive predilective affinity for this protein.

TABLE 1.—*Distribution of selenium in plasma proteins, fractionated by P. E. Howe's method*

Number of experiment	65	85	110	68
Total blood selenium, micrograms percent	260	320	250	----------
Selenium in erythrocytes, percent of total	60	47	42	----------
Plasma selenium, percent of total	40	53	58	----------
Percent of total plasma selenium in:				
Fibrinogen	29	42	42	31
Combined globulins	32	26	24	38
Euglobulin	18	11	----------	----------
Pseudoglobulin I	7	6	----------	----------
Pseudoglobulin II	7	9	----------	----------
Albumin	32	26	26	31
Nonprotein	7	6	8	trace

SELENIUM IN THE LIVER PROTEINS

The ground livers were extracted three times by stirring for 1 hour at 5° C. with successive portions of 6, 2, and 2 cc. of 5 percent $MgSO_4$ solution per gram of liver and were separated by centrifugation. The selenium content of the insoluble residue and an aliquot of the "extract" was determined. The bulk of the extract was then fractionated in one series of experiments by the method of Halliburton (*10*), and in another by the method of Luck (*11*). The extractable selenium in the whole series of eight experiments, summarized in tables 2 and 3, varied from about 45 to nearly 90 percent of the total selenium in the liver. The nonprotein selenium fraction in this series, as in preceding experiments on the plasma, was relatively low. By far the greater part of the selenium in the extractable proteins was found in the α globulin and nucleo-albumin fractions of Halliburton and in the combined globulin II and euglobulin fractions of Luck. The albumin fractions by either method contained relatively little selenium. Though it is not possible definitely to correlate the protein

fractions as obtained by the two methods, we may assume that the α globulin and nucleo-albumin fractions of Halliburton represent nearly the equivalent of Luck's three globulins. On this basis we have shown in table 4 the selenium distribution in the liver proteins as determined by the two methods. About three-fourths of the total extractable selenium is thus found in the combined globulins and the remaining one-fourth is divided between the albumin and the "undetermined" fractions, the latter consisting of a small fraction removable by trichloracetic acid and the nonprotein fraction. It seems probable that in the Halliburton method all of the albumin selenium does not separate out at 72° C. and some of it goes over into the trichloracetic acid fraction.

TABLE 2.—*Distribution of selenium in liver proteins, fractionation by the method of W. D. Halliburton*

Number of experiment	39	60	65
Total liver selenium, micrograms	290	355	660
Selenium in insoluble residue, percent of total	31	54	43
Selenium in soluble fraction, percent of total	69	46	57
Percent of total soluble selenium in:			
α Globulin (47° C.)	50	28	36
Nucleo albumin (57° C.)	30	34	39
Albumin+β globulin (72° C.)	5	7	8
Undetermined	15		
Trichloracetic acid precipitate		14	8
Nonprotein		17	9

TABLE 3.—*Distribution of selenium in liver proteins, fractionation by the method of J. M. Luck*

Number of experiment	41	78	79	68 [1]	110 [1]
Total liver selenium, micrograms	750	740	545	575	805
Selenium in insoluble residue, percent of total	40	43	17	12	29
Selenium in soluble fraction, percent of total	60	57	83	88	71
Percent of total soluble selenium in—					
Globulin II	48	51	58	14	40
Euglobulin	16	20	19	45	37
Pseudoglobulin	4	5	3	12	4
Albumin	11	12	16	25	17
Undetermined	18		4		
Trichloracetic acid precipitate		4		0	0
Nonprotein		8		4	2

[1] Liver frozen with liquid air.

TABLE 4.—*Selenium distribution in liver proteins as between globulins, albumin, and the undetermined fraction*

	Combined globulins	Albumin	Undetermined
Method of Halliburton:			
Exp. 39	80	5	15
Exp. 60	62	7	31
Exp. 65	75	8	17
Method of Luck:			
Exp. 41	68	14	18
Exp. 78	76	12	12
Exp. 79	80	16	4
Exp. 68	71	25	4
Exp. 110	81	17	2

In his fractionation experiments on rat livers Luck (*11*) found an average of 5.0 gm. globulin II, 4.6 gm. euglobulin, 1.1 gm. pseudoglobulin, and 0.9 gm. albumin per 100 gm. of liver. Assuming that the protein distribution of his animals parallels these, it would appear that the selenium distribution in the liver proteins generally parallels that of the nitrogen. An exception to this appears to be in the insoluble residue which in our experiments contained as much as 43 percent of the total liver selenium, while in Luck's experiments it contained less than 10 percent of the total liver protein.

SELENIUM FREED FROM PROTEIN COMBINATION BY TRYPTIC DIGESTION

Digestion of selenized livers with trypsin at pH 7.2 to 8.0 for about 20 hours at 38° C. sets free about 80 percent of the selenium from its protein combination. On the average about 20 percent of the liver selenium remains with the undigested residue, and this cannot be released by further digestion. Various procedures of adsorption and precipitation were tried in an attempt to remove the selenium from the protein-free filtrate of the liver digests with only partial or no success. These experiments are summarized in table 5.[2] Precipitation of the digests with phosphotungstic acid or silver nitrate failed to remove any selenium. Procedures 8, 9, and 10 which effected some separation of selenium are probably sufficiently drastic to cause degradation of the organic compound or compounds to inorganic selenium.

TABLE 5.—*The liberation of selenium from selenized livers by tryptic digestion and attempts to remove it from the protein-free filtrate*

Average percent of total liver selenium in protein residue after tryptic digestion, 13 experiments (Max. 36; min. 12; std. dev.=7.9)	22
Average percent of total liver selenium in protein-free filtrate	78

Procedures tried for removal of selenium from protein-free filtrate	Percent of total selenium removed
Adsorption on Norite or fuller's earth from acid or neutral solutions	trace
Precipitation with digitonin	0
Precipitation with tannic acid	0
Precipitation with uranium acetate	0
Precipitation with picric or picrolonic acid	0
Precipitation with phosphotungstic acid in HCl	0
Precipitation with $AgNO_3$, pH 4.0 to 8.0	trace
Precipitation with cuprous oxide and H_2SO_4:	
Without reduction	trace
With reduction	55
Precipitation with mercuric acetate (all is removed when sodium selenite, selenate or diselenodiacetic acid is added to control protein-free filtrate)	50
Electrolysis in acid solution (80 percent is removed when sodium selenite, selenocystine, or diselenodiacetic acid is added to control protein-free filtrate)	40

Having failed to remove the selenium from the protein-free digests by methods commonly used for the separation of certain amino acids,

[2] Butyl alcohol continuous extraction which is often used to remove monoamino monocarboxylic acids from protein hydrolysates (*12, 13*) removes considerable selenium. This is being investigated further.

a more or less empirical procedure of fractionation was adopted. For comparison the behavior of sodium selenite, sodium selenate, and two organic selenium compounds, diselenodiacetic acid and seleno-cystine (*14*) [3] was studied by adding them to normal livers which were subjected to tryptic digestion in the usual manner and subsequent fractionation. The fractionation procedure was, briefly, as follows: The trichloracetic acid filtrate was treated with lead acetate to remove polypeptides and other products of partial digestion; the lead after filtration was removed with Na_2SO_4, and the sulfate with a slight excess of $BaCl_2$. The clear filtrate (pH about 2.0) was distilled *in vacuo* to about 1/10 volume and treated with ethyl alcohol to make 90 percent by volume. The precipitate was filtered off and NaOH added to the filtrate to pH 7.0. A second precipitate formed which was filtered off. The filtrate was distilled *in vacuo* to remove the alcohol and the small aqueous residue plus 0.5 cc. of 12 percent $BaCl_2$ treated with 10 volumes acetone. A gel-like precipitate formed on standing in the cold room, which was separated from the solution by filtration.

TABLE 6.—*Distribution of selenium in tryptic liver digests*

	Chronic selenosis					Added selenium as—			
	71	D37	93	94	106	Diseleno-diacetic acid	Seleno-cystine	Sodium selenate	Sodium selenite
Total liver selenium, micrograms	460	350	900	510	585	500	500	920	500
Percent of total selenium in liver residue	22	36	25	31	34	25	46	17	92
Percent of total selenium in protein-free filtrate	78	64	75	69	66	75	54	83	8
Percent of protein-free filtrate selenium in:									
Lead acetate precipitate	0	7	2	8	13	15	4	79	(25γ)
Lead sulfate precipitate	0	5	3	trace	6	trace	7	4	0
Barium sulfate precipitate	trace	0	0	0	7	trace	3	3	0
Acid 90 percent alcohol precipitate	trace	trace	8	3	5	9	43	5	(15γ)
Neutral 90 percent alcohol precipitate	62	43	7	31	13	45	2	5	0
Acetone precipitate	33	45	80	63	52	29	41	1	0
Acetone solution	5	trace	trace	trace	4	2	0	0	0

The results of these experiments are shown in table 6. In a series of five such experiments on selenized livers little selenium separated out in any of the fractions up to the precipitate obtained from neutral 90 percent alcohol. Indeed this, together with the selenium in the succeeding acetone precipitate, accounted for about 90 percent of the total liver selenium released from protein combination by tryptic digestion.[4] By contrast, nearly all the selenium of added sodium selenite remained with the undigested liver residue, and about 80

[3] A small amount of dl seleno-cystine was obtained through the courtesy of Dr. M. X. Sullivan of Georgetown University. The compound had been prepared in Dr. Fredga's laboratory.

[4] In two experiments similarly made on a peptic digest, the results were not significantly different, though some 15 percent of the selenium in the protein-free filtrate separated out in the acid alcohol fraction, and 31 to 36 percent of the total liver selenium remained with the undigested residue.

percent of the selenium in the protein-free filtrate from added sodium selenate separated out in the lead acetate precipitate. The distribution of selenium from added selenocystine also appears significantly different from tissue digest selenium, while the distribution of selenium from added diselenodiacetic acid resembles the tissue selenium quite closely. On the basis of these observations it appears that tissue selenium behaves similarly to the dicarboxylic acid, though this does not necessarily prove their chemical similarity.

The greater stability of the tissue selenium compound compared with selenocystine [5] and its somewhat different distribution suggested the desirability of studying the distribution of cystine in tryptic liver digests when subjected to a similar procedure of fractionation. We were aware from the work of Jones (*15*) that much of the cystine in casein is destroyed by alkaline tryptic digestion. Nevertheless, it seemed of interest to determine the path of distribution of the cystine fraction escaping destruction. Accordingly, several experiments were made in which selenized livers were digested and the digests fractionated as outlined above, and the cystine content of the various fractions was determined by the method of Sullivan (*16*) as used by Rossouw and Wilken-Jorden (*17*).

The following are typical experiments. A selenized rabbit liver weighing 57 grams was digested with trypsin in the usual manner. Assuming equal distribution of cystine throughout the liver, analysis of a portion of the liver indicated that the portion digested plus the small amount of cystine in the trypsin contained 153 milligrams of cystine. Analysis of the several fractions revealed 9 milligrams of cystine in the undigested residue, 0.2 milligrams in the lead acetate precipitate, and 2.4 milligrams in the acid alcohol fraction. There was no cystine in any of the other fractions. It follows from this that only 8 percent of the total liver cystine escaped destruction, and nearly all of the cystine of the protein-free filtrate was found in the acid alcohol fraction, where it separated out probably as the barium salt.

In another experiment on a selenized liver subjected to peptic digestion and subsequent fractionation the several fractions gave the following values for cystine and selenium:

Fraction	*Percent of total in protein-free filtrate*	
	Cystine	*Selenium*
Lead acetate	13	10
Lead sulfate	trace	7
Barium sulfate	trace	7
Acid alcohol precipitate	87	15
Neutral alcohol precipitate	trace	15
Acetone precipitate	0	47
Acetone solution	0	trace

[5] This compound is considerably less stable than its sulfur analog. (Unpublished observations; see also Fredga (*14*).)

The cystine content in the protein-free filtrate in this case was about 14 percent of the estimated total liver cystine.

Tentatively taking the above-mentioned resemblance to diselenodiacetic acid as one bit of evidence, this appears to be additional evidence against the assumption that tissue selenium is chemically or physically closely associated with cystine. However, in view of the finding that so much of the cystine appears to be destroyed, this statement is made with due reservations.

The ninhydrin test applied to the various fractions in one experiment gave a positive reaction with the acid and neutral alcohol precipitates, and a doubtful or negative reaction with the acetone precipitate which, as shown in table 6, often contains most of the selenium.

Though our experiments give no conclusive proof, they suggest that the selenium compound (or compounds) released from the tissues by tryptic or peptic digestion is not necessarily related to cystine and it does not have the characteristics of the histone bases. Its distribution by the fractionation procedure described herein suggests that it might have the properties of a dicarboxylic acid after its release but it is not certain that it exists as such in the tissues. We have no data on the nature of the selenium remaining in the residue after digestion. In this connection Horn, Nelson, and Jones (*18*) found that the selenium in a sulfuric acid hydrolysate of selenized wheat protein was not associated with the dicarboxylic amino acids or histone bases but was in what might be termed the leucine fraction.

SUMMARY

The distribution of selenium in plasma and liver proteins of chronically poisoned animals has been studied. Selenium has been found to occur in all the proteins examined, though predominantly in the globulins.

Tryptic (and also peptic) digestion of the selenized liver releases about 80 percent of the selenium from its protein combination. The selenium compound (or compounds) is not removable by procedures commonly employed for the removal of the histone bases from protein hydrolysates.

A procedure adopted for the fractionation of the protein-free liver digest shows that the separation of the selenium compound (or compounds) does not parallel that of the cystine.

REFERENCES

(*1*) Smith, M. I., Westfall, B. B., and Stohlman, E. F.: Studies on the fate of selenium in the organism. Pub. Health Rep., **53**: 1199 (1938).
(*2*) Westfall, B. B., and Smith, M. I.: Experiments on the separation of selenium from its combination with protein in grain. Cereal Chem., **16**: 231 (1939).
(*3*) Smith, M. I.: The influence of diet on the chronic toxicity of selenium. Pub. Health Rep., **54**: 1441 (1939).

(4) Moxon, A. L.: Alkali disease or selenium poisoning. S. Dak. Exp. Station Bull. No. 311, p. 50 (1937).
(5) Lewis, H. B., Shultz, J., and Gortner, R. A., Jr.: Dietary protein and the toxicity of sodium selenite in the white rat. J. Pharm. and Exp. Therap., 68: 292 (1940).
(6) Gortner, R. A., Jr.: Chronic selenium poisoning of rats as influenced by dietary protein. J. Nutrit., 19: 105 (1940).
(7) Smith, M. I., and Lillie, R. D.: Chronic toxicity of naturally occurring food selenium. *In* National Inst. Health Bull. No. 174, Studies in chronic selenosis, pt. 1, pp. 1-13 (1940) (in press).
(8) Westfall, B. B., and Smith, M. I.: Selenium in the hair as an index of the extent of its deposition in the tissues in chronic poisoning. *In* National Inst. Health Bull. No. 174, Studies in chronic selenosis, pt. 4, pp. 45-48 (1940) (in press).
(9) Howe, P. E.: The determination of fibrinogen by precipitation with sodium sulfate compared with the precipitation of fibrin by the addition of calcium chloride. J. Biol. Chem., 57: 235 (1923).
The relative precipitating capacity of certain salts when applied to blood serum or plasma and the influence of cation in the precipitation of proteins. Ibid., 57: 241 (1923).
(10) Halliburton, W. D.: The proteids of kidney and liver cells. J. Physiol., 13: 806 (1892).
(11) Luck, J. M.: Liver protein. I. The question of protein storage. J. Biol. Chem., 115: 491 (1936).
(12) Dakin, H. D.: Die Aminosäuren des Zein. Z. Physiol. Chem., 130: 159 (1923).
(13) Woolley, D. W.: Improved extractor for monoamino acids. Ind. Eng. Chem., Anal. Ed., 9: 433 (1937).
(14) Fredga, A.: Selensubstituierte Aminosäuren. I. Synthese von $\gamma\gamma'$-diamino-diselen-dihydrakrylsäure (Selencystin). Svensk Kemisk Tidskrift, 48: 160 (1936).
(15) Jones, D. B., and Gersdorff, C. E. F.: Studies on digestibility of proteins in vitro. VII. Liberation of cystine on tryptic digestion of casein, with observations on the instability of cystine toward alkali. J. Biol Chem., 129: 207 (1939).
(16) Sullivan, M. X.: Studies on the biochemistry of sulfur. IV. The colorimetric estimation of cystine in casein by means of the beta-naphthoquinone reaction. Supplement No. 78 to the Public Health Reports, U. S. Government Printing Office (1929).
(17) Rossouw, S. D., and Wilken-Jorden, T. J.: Studies on the origin of the sulfur in wool. I. A study of the Sullivan technique for cystine. Onderstepoort J. Veter. Sc. and Animal Industry, 2: 361 (1934).
(18) Horn, M. J., Nelson, E. M., and Jones, D. B.: Studies on toxic wheat grown on soils containing selenium. Cereal Chem., 13: 126 (1936).

THE RELATIVE TOXICITY OF LEAD AND SOME OF ITS COMMON COMPOUNDS [1]

A REVIEW

This investigation was undertaken because of the lack of definite information with regard to the comparative toxic properties of various lead compounds. A study was made of lead poisoning following the administration of lead compounds by mouth, by intraperitoneal injection, and by inhalation. The lead compounds studied in addition to metallic lead were the arsenate, carbonate, chromate, monoxide,

[1] Public Health Bulletin No. 253. The Relative Toxicity of Lead and Some of its Common Compounds. By Lawrence T. Fairhall and R. R. Sayers. With a section on pathology by J. W. Miller. Government Printing Office, Washington, 1940. Available from the Superintendent of Documents, Washington, D. C., at 25 cents per copy.

dioxide, tetroxide, phosphate, sulfate, silicate, and sulfide. Symptoms of lead poisoning were sought; body weight changes and mortality figures were collected; blood changes were studied; and the distribution of lead in the various tissues such as the liver, kidney, and bones was determined by analytical means in order to find the degree of lead absorption that had occurred. The lead content of the lungs of those animals exposed by inhalation was found and particle size of suspended lead fume or dust as well as the total lead content of the dusty air was determined for those groups.

Lead (and most of its compounds) was shown to be more toxic by inhalation than either by ingestion or intraperitoneal injection. Lead arsenate was shown to be particularly toxic on intraperitoneal injection. Lead carbonate, lead monoxide, and lead sulfate were shown to be more toxic by mouth and lead carbonate and lead monoxide were more toxic following inhalation than the remaining lead compounds. The pathological changes associated with this degree of lead absorption were studied in detail. It was found that splenic hemosiderosis is a fair pathological index of lead intoxication and that the amount of hemosiderosis in the spleen closely follows the relative toxicity described above. Greater pathological differences were noted between the various lead compounds on intraperitoneal injection than were noted by ingestion and inhalation. The behavior of the lead compounds in the peritoneal tissue indicates that the compounds are but slowly absorbed and that during the process the nodules have the appearance of those produced by the inert group of mineral dusts.

COURT DECISION ON PUBLIC HEALTH

Provisions of city ordinance, fixing hours for operation of barber shops and granting power to city health director relative thereto, held invalid.—(Pennsylvania Superior Court; *Kellerman et al.* v. *City of Philadelphia et al.*, 13 A.2d 84; decided April 18, 1940.) A section of an ordinance of the city of Philadelphia regulating barbering fixed the hours during which barber shops could remain open for business. There was a proviso that "the director of public health, upon application of the proprietor of any barber shop and proof that barber service to the public so requires, may issue a permit for the operation of a particular barber shop at such hours beyond those above prescribed as in the opinion of the * * * director * * * public necessity may require." In a suit to enjoin the enforcement of those provisions restricting the hours of business the superior court held that the above-mentioned proviso contained an unlawful delegation of legislative power. The court observed that the standard erected for the guidance of the director in the exercise of his discretion to suspend the provisions of

the ordinance was "public necessity" as "in the opinion" of that officer it may appear. This, it was the court's view, was not a sufficient standard to guide properly his determinations. "He is entrusted," said the court, "with purely discretionary powers. The term 'public necessity' has no other meaning than that which may be attributed to it by him in his 'unfettered and uncontrolled' judgment upon each application." Further, the court was of the opinion that the entire section was invalid, it being pointed out that the right of the city to pass an ordinance fixing the days and hours during which barber shops could be open was granted by an act of the legislature on the express condition that the proviso in question should be contained in the ordinance.

DEATHS DURING WEEK ENDED AUGUST 17, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 17, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	6,918	7,239
Average for 3 prior years	7,426	
Total deaths, first 33 weeks of year	255,680	260,216
Deaths under 1 year of age	450	478
Average for 3 prior years	521	
Deaths under 1 year of age, first 33 weeks of year	16,621	16,753
Data from industrial insurance companies:		
Policies in force	64,932,518	66,825,741
Number of death claims	12,001	10,794
Death claims per 1,000 policies in force, annual rate	9.7	8.4
Death claims per 1,000 policies, first 33 weeks of year, annual rate	10.0	10.5

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 24, 1940

Summary

Of the 9 communicable diseases reported in the following weekly table, the incidence of only 3—influenza, measles, and poliomyelitis—was above the 5-year (1935–39) median expectancy.

A total of 623 cases of poliomyelitis was reported, as compared with 389 for the preceding week and with a 5-year median of 391. This represents an increase of 60 percent during the current week, as compared with a 41 percent increase for each of the preceding 2 weeks. All geographic areas except the New England, East South Central, and the Pacific States shared in this increased incidence.

The largest numbers of cases and the largest numerical increases occurred in the States of the two North Central areas. These States, with approximately 30 percent of the total population, reported 418 cases, or 67 percent of the total number of cases reported for the current week. The individual States in these areas reporting the largest numbers of cases (with last week's figures in parentheses) are as follows: Michigan 98 (41), Indiana 79 (58), Iowa 73 (25), Ohio 46 (36), Kansas 42 (30), and Illinois 21 (7). In the South Atlantic States, West Virginia reported 46 cases as compared with 31 last week.

The incidence of poliomyelitis remained below the 5-year median from the week of June 15 to the week of August 3. For the 3 weeks ended August 10, 17, and 24, respectively, it has been above the median expectancy.

In 5 of the past 10 years the peak week of poliomyelitis in the United States has come in September. The earliest was the third week of June (1934), and the latest was the first week of October (1930 and 1936). In both 1935 and 1938 the largest numbers of cases were reported for the fourth week of August.

For the current week the Bureau of the Census reports 7,063 deaths in 88 major cities of the United States, as compared with 6,948 for the preceding week and with a 3-year (1937–39) average of 7,064 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended August 24, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Aug. 24, 1940	Aug. 26, 1939		Aug. 24, 1940	Aug. 26, 1939		Aug. 24, 1940	Aug. 26, 1939		Aug. 24, 1940	Aug. 26, 1939	
NEW ENG.												
Maine	1	0	0	------	------	------	2	6	7	0	0	0
New Hampshire	0	0	0	------	------	------	0	0	0	0	0	0
Vermont	0	0	0	------	------	------	1	16	7	0	0	0
Massachusetts	1	4	2	------	------	------	70	33	33	2	0	0
Rhode Island	0	0	0	------	------	------	10	11	4	0	0	0
Connecticut	0	0	0	------	------	------	4	9	9	0	0	0
MID. ATL.												
New York	7	8	10	[1] 4	[1] 2	[1] 2	138	64	93	2	2	3
New Jersey [2]	5	0	6	------	2	6	60	10	32	0	1	1
Pennsylvania	2	13	18	------	------	------	107	28	39	1	4	2
E. NO. CEN.												
Ohio	12	8	11	8	2	2	15	14	17	2	1	1
Indiana [2]	0	5	9	------	3	5	2	3	4	0	0	0
Illinois [2]	8	15	15	------	4	4	35	12	32	2	1	8
Michigan [3]	5	13	6	6	1	1	83	0	24	1	0	0
Wisconsin	0	4	1	11	29	20	82	24	24	1	0	1
W. NO. CEN.												
Minnesota	0	3	1	5	1	1	2	23	2	0	0	0
Iowa [2]	5	2	2	3	------	------	7	8	3	2	0	1
Missouri [2]	9	9	6	1	1	8	8	1	2	2	0	1
North Dakota	8	2	2	------	------	------	0	1	1	1	0	0
South Dakota	0	4	0	------	------	------	0	1	0	0	0	0
Nebraska	0	2	2	------	------	------	1	1	3	1	0	0
Kansas	6	8	8	2	1	1	9	11	6	1	1	1
SO. ATL.												
Delaware	0	0	0	------	------	------	0	2	1	0	0	0
Maryland [2,3]	8	0	8	3	------	------	8	3	10	0	1	1
Dist. of Col. [3]	1	2	2	------	1	------	2	2	2	0	0	1
Virginia [2]	2	18	21	83	21	------	27	5	15	0	0	1
West Virginia [3]	1	3	10	18	8	10	1	1	4	1	0	1
North Carolina [3]	9	81	31	------	------	------	4	5	5	0	1	1
South Carolina [4]	8	9	9	120	143	80	16	4	4	0	1	0
Georgia [2,4]	10	40	22	1	1	------	0	2	0	0	0	0
Florida [4]	3	3	3	1	3	1	2	2	4	0	0	0
E. SO. CEN.												
Kentucky	7	17	15	------	3	3	15	2	4	0	0	0
Tennessee [4]	2	6	14	6	18	12	23	7	7	1	0	1
Alabama [4]	10	17	17	1	6	5	26	17	5	2	1	1
Mississippi [2,4]	8	19	16	------	------	------	------	0	------	0	0	0
W. SO. CEN.												
Arkansas	8	8	11	1	15	5	10	5	4	0	0	0
Louisiana [4]	10	5	10	2	7	7	2	1	2	3	0	1
Oklahoma	2	7	8	20	10	10	3	3	4	0	2	0
Texas [4]	11	23	25	61	36	36	24	16	15	1	1	1
MOUNTAIN												
Montana	2	1	1	------	9	------	5	6	4	0	1	0
Idaho	0	0	0	------	------	1	0	1	2	0	0	0
Wyoming	0	0	0	------	------	------	3	3	1	0	0	0
Colorado	7	10	7	2	2	------	5	3	3	0	1	1
New Mexico	2	1	2	1	------	------	1	0	5	0	1	1
Arizona	1	6	2	12	15	11	12	3	3	0	0	0
Utah [2,3]	1	0	1	------	3	------	9	6	6	0	1	0
PACIFIC												
Washington	0	1	2	------	------	------	9	26	17	0	0	0
Oregon	1	3	1	4	1	3	15	9	7	2	0	0
California	8	17	19	4	8	11	31	49	49	0	0	2
Total	181	342	342	384	356	286	879	459	733	28	21	51
34 weeks	9, 046	12, 310	14, 910	169, 606	152, 006	141, 878	229, 371	348, 906	348, 906	1, 145	1, 408	4, 221

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 24, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Aug. 24, 1940	Aug. 26, 1939		Aug. 24, 1940	Aug. 26, 1939		Aug. 24, 1940	Aug. 26, 1939		Aug. 24, 1940	Aug. 26, 1939	
NEW ENG.												
Maine	0	0	0	1	2	2	0	0	0	0	1	2
New Hampshire	0	0	0	0	0	0	0	0	0	1	0	0
Vermont	0	0	1	1	3	1	0	0	0	1	0	0
Massachusetts	4	2	4	21	12	25	0	0	0	1	4	3
Rhode Island	1	0	1	0	0	2	0	0	0	1	2	1
Connecticut	0	0	1	2	5	6	0	0	0	3	4	2
MID. ATL.												
New York	14	60	60	57	54	67	0	0	0	18	14	22
New Jersey [2]	4	20	8	18	15	17	0	0	0	8	7	9
Pennsylvania	7	10	10	31	30	78	0	0	0	15	12	25
E. NO. CEN.												
Ohio	46	2	4	48	43	48	0	3	0	18	15	17
Indiana [2]	79	0	1	17	21	21	1	0	1	1	5	8
Illinois [2]	21	14	14	43	51	52	0	8	1	12	23	28
Michigan [3]	98	115	31	30	37	40	1	0	0	4	7	13
Wisconsin	12	6	8	38	39	39	2	3	0	0	9	2
W. NO. CEN.												
Minnesota	8	38	3	14	10	10	2	0	0	0	4	3
Iowa [2]	73	1	1	14	10	16	1	3	2	8	28	4
Missouri [2]	18	2	2	14	15	21	0	0	0	20	26	23
North Dakota	2	2	0	0	4	9	1	2	1	0	5	1
South Dakota	4	3	2	1	8	7	0	2	0	0	3	1
Nebraska	15	0	1	3	5	3	0	0	0	1	1	1
Kansas	42	1	0	20	19	18	0	2	0	5	6	8
SO. ATL.												
Delaware	0	0	0	2	0	0	0	0	0	1	0	1
Maryland [2 3]	1	1	1	3	7	7	0	0	0	6	7	18
Dist. of Col. [2]	0	1	2	3	5	5	0	0	0	5	1	3
Virginia [2]	6	1	4	12	24	11	0	0	0	5	20	20
West Virginia [3]	46	0	0	20	24	24	0	0	0	6	6	16
North Carolina [2]	4	9	4	13	24	16	0	1	0	8	14	21
South Carolina [1]	0	16	1	5	5	2	2	0	0	24	7	14
Georgia [2 4]	0	4	2	6	8	10	0	1	0	19	28	28
Florida [4]	2	2	1	3	2	2	0	0	0	3	3	1
E. SO. CEN.												
Kentucky	18	1	4	13	27	20	0	0	0	15	30	49
Tennessee [4]	1	2	5	10	16	15	0	0	0	21	15	32
Alabama [4]	0	1	1	14	26	9	0	0	0	13	17	19
Mississippi [3 4]	5	1	1	5	4	5	0	0	0	11	15	8
W. SO. CEN.												
Arkansas	1	1	1	4	9	8	0	0	0	26	22	22
Louisiana [4]	10	1	2	2	10	2	0	0	0	25	29	23
Oklahoma	14	1	1	7	5	5	1	2	0	25	24	24
Texas [4]	14	10	4	14	25	23	0	0	0	50	28	50
MOUNTAIN												
Montana	15	0	1	2	6	6	0	0	2	0	1	2
Idaho	2	0	0	2	1	5	0	1	1	0	1	1
Wyoming	0	0	0	2	3	3	0	0	0	4	2	0
Colorado	2	3	0	5	7	8	2	1	1	3	1	5
New Mexico	2	3	0	2	3	2	0	0	0	4	1	4
Arizona	1	3	0	1	1	1	0	1	0	0	5	5
Utah [2 3]	4	2	1	5	14	12	0	0	0	1	6	2
PACIFIC												
Washington	13	1	2	14	6	10	0	0	4	0	4	4
Oregon	1	1	0	5	2	7	0	0	1	2	6	4
California	13	50	24	41	44	59	0	4	2	9	10	10
Total	623	391	391	588	697	804	13	34	34	412	479	584
34 weeks	2,682	2,539	2,539	119,475	117,179	165,702	1,971	8,691	8,046	5,405	7,584	8,725

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 24, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough, Week ended— Aug. 24, 1940	Whooping cough, Week ended— Aug. 26, 1939
NEW ENG.		
Maine	16	29
New Hampshire	0	0
Vermont	0	54
Massachusetts	116	95
Rhode Island	7	24
Connecticut	38	75
MID. ATL.		
New York	247	359
New Jersey [2]	112	109
Pennsylvania	400	232
E. NO. CEN.		
Ohio	263	147
Indiana [2]	11	50
Illinois [2]	156	205
Michigan [3]	215	181
Wisconsin	102	140
W. NO. CEN.		
Minnesota	40	42
Iowa [2]	22	13
Missouri [2]	42	30
North Dakota	21	31
South Dakota	3	3
Nebraska	3	4
Kansas	26	25
SO. ATL.		
Delaware	0	3
Maryland [2,3]	90	56
Dist. of Col. [2]	6	35
Virginia [2]	59	57
West Virginia [3]	62	7
SO. ATL.—continued		
North Carolina [2]	82	114
South Carolina [4]	25	18
Georgia [2,4]	11	6
Florida [4]	1	6
E. SO. CEN.		
Kentucky	66	40
Tennessee [4]	30	42
Alabama [4]	55	45
Mississippi	---------	---------
W. SO. CEN.		
Arkansas	18	6
Louisiana [4]	57	3
Oklahoma	8	6
Texas [4]	188	59
MOUNTAIN		
Montana	9	2
Idaho	8	3
Wyoming	0	0
Colorado	13	10
New Mexico	4	6
Arizona	5	60
Utah [2,3]	26	50
PACIFIC		
Washington	23	14
Oregon	21	12
California	258	90
Total	2,965	2,607
34 weeks	110,137	129,238

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended August 24, 1940, 20 cases as follows: New Jersey, 1; Indiana, 1; Illinois, 2; Iowa, 2; Missouri, 2; Maryland, 2; District of Columbia, 1; Virginia, 4; North Carolina, 3; Georgia, 1; Utah, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended August 24, 1940, 39 cases as follows: South Carolina, 2; Georgia, 8; Florida, 4; Tennessee, 1; Alabama, 8; Mississippi, 1; Louisiana, 4; Texas, 11.

PLAGUE INFECTION IN FLEAS FROM GROUND SQUIRRELS IN SAN BERNARDINO COUNTY, CALIF.

Under date of August 13, 1940, Dr. Harlan L. Wynne, of the Department of Public Health of California, reported plague infection proved in a pool of 129 fleas from 15 ground squirrels (*C. fisheri*) submitted to the laboratory on July 15 from Arrowhead Dump, 1 mile east of Lake Arrowhead, San Bernardino County, Calif.

WEEKLY REPORTS FROM CITIES

City reports for week ended August 10, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	82	26	11	342	266	246	3	347	73	1,334	-------
Current week [1]	33	22	9	631	229	178	1	290	60	1,123	-------
Maine:											
Portland	0	------	0	1	3	0	0	0	0	8	18
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	18
Manchester	0	------	0	0	0	0	0	0	0	0	13
Nashua	0	------	0	0	0	0	0	0	0	0	6
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	1
Burlington	0	------	0	0	0	0	0	0	0	0	8
Rutland	0	------	0	0	0	0	0	1	0	0	4
Massachusetts:											
Boston	1	------	0	27	5	6	0	7	1	38	192
Fall River	0	------	0	5	0	0	0	1	0	3	17
Springfield	0	------	0	2	1	1	0	0	0	0	35
Worcester	0	------	0	37	2	1	0	1	0	14	46
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	15
Providence	0	------	0	11	2	0	0	0	0	1	46
Connecticut:											
Bridgeport	0	------	0	0	1	0	0	1	0	2	29
Hartford	0	------	0	3	0	0	0	0	0	2	35
New Haven	0	------	0	1	0	1	0	0	2	5	33
New York:											
Buffalo	0	------	0	2	7	6	0	5	1	8	133
New York	7	1	0	100	45	22	0	65	6	122	1,123
Rochester	0	------	0	0	2	1	0	0	0	12	73
Syracuse	0	------	0	1	3	0	0	0	0	21	48
New Jersey:											
Camden	0	------	0	0	0	7	0	0	0	0	26
Newark	0	1	0	34	0	3	0	9	1	15	80
Trenton	0	------	0	2	4	0	0	0	2	0	36
Pennsylvania:											
Philadelphia	0	------	0	55	11	9	0	16	3	49	402
Pittsburgh	3	2	2	0	9	6	0	5	2	31	134
Reading	0	------	0	1	0	0	0	3	0	22	26
Scranton	0	------	--------	0	-----	0	0	------	0	0	--------
Ohio:											
Cincinnati	0	------	0	0	2	1	0	1	0	14	127
Cleveland	0	3	1	2	4	5	0	4	1	62	150
Columbus	0	------	0	1	2	2	0	0	0	6	74
Indiana:											
Anderson	0	------	0	1	0	1	0	0	1	1	9
Fort Wayne	0	------	0	0	1	0	0	0	1	4	20
Indianapolis	1	------	1	1	4	2	0	1	3	10	71
Muncie	0	------	0	0	1	0	0	0	0	4	10
South Bend	0	------	0	0	1	0	0	1	0	0	13
Terre Haute	1	------	0	0	0	0	0	0	0	0	17
Illinois:											
Alton	0	------	0	0	0	0	0	0	1	1	7
Chicago	1	1	1	23	10	31	0	38	4	77	597
Elgin	0	------	0	0	0	0	0	0	0	3	6
Springfield	0	------	0	0	1	0	0	0	0	0	17
Michigan:											
Detroit	1	------	0	101	4	15	0	13	1	140	227
Flint	0	------	0	0	0	3	0	0	0	1	24
Grand Rapids	0	------	0	2	0	1	0	1	1	23	23
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	0	7
Madison	0	------	0	0	0	1	0	0	0	4	14
Milwaukee	------	------	------	------	------	------	------	------	------	------	------
Racine	0	------	0	0	0	1	0	0	0	0	12
Superior	0	------	0	0	0	2	0	0	0	0	5
Minnesota:											
Duluth	0	------	0	1	0	2	1	0	0	3	22
Minneapolis	0	------	0	1	2	6	0	0	0	13	74
St. Paul	0	------	0	1	3	1	0	0	0	7	56

[1] Figures for Milwaukee estimated; report not received.

City reports for week ended August 10, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Iowa:											
Cedar Rapids	0			0		0	0		0	2	
Davenport	0			0		2	0		0	0	
Des Moines	0		0	0	0	0	0	0	0	0	24
Sioux City	0			0		1	0		0	0	
Waterloo	0			1		2	0		0	0	
Missouri:											
Kansas City	0		0	2	5	1	0	3	1	3	76
St. Joseph	0		0	0	5	0	0	0	0	0	32
St. Louis	0		0	0	12	4	0	7	5	28	189
North Dakota:											
Fargo	0		0	0	1	0	0	0	0	1	8
Grand Forks	0			0		0	0		0	0	
Minot	0		0	0	0	0	0	0	0	1	12
South Dakota:											
Aberdeen	0			0		0	0		0	6	
Sioux Falls	0		0	0	0	0	0	0	0	0	6
Nebraska:											
Lincoln	1			1		0	0		0	1	
Omaha	0		0	0	2	0	0	1	1	1	45
Kansas:											
Lawrence	0		0	0	0	0	0	0	0	0	3
Topeka	0		0	3	1	0	0	1	0	1	18
Wichita	0		0	0	2	2	0	0	0	6	36
Delaware:											
Wilmington	0		0	0	1	0	0	0	0	5	23
Maryland:											
Baltimore	0	1	0	1	4	2	0	10	1	97	194
Cumberland	0		0	0	1	0	0	0	0	0	9
Frederick	0		0	1	0	1	0	0	2	0	3
Dist. of Col.:											
Washington	1		0	1	4	1	0	10	2	13	103
Virginia:											
Lynchburg	1		0	0	0	1	0	0	0	2	6
Norfolk	0		0	1	1	1	0	0	0	2	13
Richmond	0		0	2	1	2	0	2	2	1	35
Roanoke	0		0	10	1	0	0	0	0	0	13
West Virginia:											
Charleston	1		0	0	0	0	0	2	1	3	24
Wheeling	1		0	0	0	0	0	0	0	7	11
North Carolina:											
Gastonia	0			0		0	0		0	1	
Raleigh	0		0	0	0	0	0	0	0	6	9
Wilmington	0		0	0	0	0	0	1	0	0	8
Winston-Salem	0		0	0	0	1	0	1	1	8	14
South Carolina:											
Charleston	1		0	1	1	0	0	0	0	0	14
Florence	0	5	0	0	1	0	0	0	0	0	14
Greenville	0		0	0	0	0	0	0	1	3	14
Georgia:											
Atlanta	0	1	0	0	2	0	0	10	0	2	76
Brunswick	0		0	0	0	0	0	0	0	0	3
Savannah	0		0	0	3	0	0	1	0	0	28
Florida:											
Miami	0		0	0	0	0	0	3	1	0	39
Tampa	0		1	0	1	0	0	0	0	0	21
Kentucky:											
Ashland	0		0	1	0	0	0	2	1	0	12
Covington	0		0	0	1	0	0	1	1	1	17
Lexington	0		0	16	1	1	0	2	0	0	13
Louisville	0	1	0	0	4	5	0	2	0	15	67
Tennessee:											
Knoxville	0	2	0	0	2	0	0	0	0	1	
Memphis	0		0	0	0	0	0	4	2	5	100
Nashville	0		0	3	4	0	0	1	0	7	53
Alabama:											
Birmingham	0		0	2	5	1	0	1	1	2	48
Mobile	1		0	0	1	0	0	2	1	0	31
Montgomery	0	1		0		1	0		0	0	
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	0		0	0	1	1	0	1	0	3	
Louisiana:											
Lake Charles	0		0	0	0	0	0	0	0	0	7
New Orleans	0	1	1	0	4	0	0	11	0	2	134
Shreveport	2		0	1	2	0	0	5	0	0	38
Oklahoma:											
Oklahoma City	0		0	0	4	0	0	0	0	2	44
Tulsa	0		0	0	1	1	0	0	0	5	27

City reports for week ended August 10, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Texas:											
Dallas	1	------	0	3	1	3	0	0	1	10	67
Forth Worth	1	------	0	7	3	3	0	1	0	15	45
Galveston	1	------	0	0	1	0	0	0	0	0	22
Houston	1	------	0	1	7	1	0	5	1	11	82
San Antonio	0	------	0	0	3	0	0	4	0	23	79
Montana:											
Billings	0	------	0	0	2	0	0	0	0	0	8
Great Falls	0	------	0	2	2	0	0	0	0	1	6
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	------	0	0	0	0	0	0	0	0	3
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	1	4
Colorado:											
Colorado Springs	0	------	0	0	0	2	0	1	0	0	7
Denver	5	------	0	1	1	2	0	4	0	6	70
Pueblo	0	------	0	0	1	0	0	0	0	0	5
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	8
Utah:											
Salt Lake City	0	------	0	3	1	2	0	1	0	27	49
Washington:											
Seattle	0	------	1	1	4	0	0	3	0	23	81
Spokane	0	------	0	1	2	0	0	0	0	0	32
Tacoma	0	------	0	1	0	0	0	0	0	1	33
Oregon:											
Portland	0	------	0	0	1	0	0	0	0	8	88
Salem	0	0	------	0	------	0	0	------	0	1	------
California:											
Los Angeles	2	9	0	12	4	7	0	19	5	78	292
Sacramento	0	------	0	2	0	0	0	2	3	1	19
San Francisco	0	2	1	0	6	3	0	12	1	17	175

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Maryland:			
Boston	0	0	1	Baltimore	0	0	1
Worcester	0	1	0	Virginia:			
New York:				Norfolk	0	0	3
Buffalo	2	1	0	Richmond	0	0	4
New York	1	1	4	Kentucky:			
Rochester	0	0	1	Ashland	0	0	3
Ohio:				Louisville	0	0	1
Cleveland	1	0	1	Louisiana:			
Columbus	0	0	1	New Orleans	0	0	1
Indiana:				Shreveport	0	0	1
Indianapolis	0	0	1	Texas:			
South Bend	0	0	1	Fort Worth	0	0	3
Illinois:				Montana:			
Chicago	1	0	2	Billings	0	0	1
Michigan:				Helena	0	0	1
Detroit	0	0	2	Colorado:			
Grand Rapids	0	0	1	Pueblo	0	0	1
Wisconsin:				New Mexico:			
Madison	0	0	3	Albuquerque	0	0	1
Iowa:				Washington:			
Des Moines	0	0	1	Seattle	0	0	2
Sioux City	0	0	2	Tacoma	0	0	2
Waterloo	0	0	4	Oregon:			
Missouri:				Portland	0	0	1
Kansas City	0	0	4	California:			
Kansas:				Los Angeles	0	0	3
Wichita	0	0	5	San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 2; Philadelphia, 1; Cleveland, 1; St. Louis, 1; Minot, 1; Washington, D. C., 1; Oklahoma City, 2.

Pellagra.—Cases: Philadelphia, 1; Charleston, S. C., 1; Atlanta, 1; Savannah, 1; New Orleans, 1; Los Angeles, 3.

Rabies in man.—Deaths: Greenville, 1.

Typhus fever.—Cases: New York, 2; Atlanta, 1; Savannah, 3; Miami, 7 (including delayed report of 3 cases); Mobile, 2; Montgomery, 1; Houston, 1; Los Angeles, 2.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 20, 1940.—During the week ended July 20, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					1					1
Chickenpox		5	5	43	156	26	14	12	20	281
Diphtheria		2		13		3	6			24
Dysentery				18	1				2	21
Influenza					3				16	19
Measles		1	1	43	86	43	203	4	31	412
Mumps				10	63	3	5		2	83
Pneumonia					24	1			4	29
Poliomyelitis								1		1
Scarlet fever		1	2	50	37	3		5	2	100
Tuberculosis	5	8	4	107	43	52	2	1		222
Typhoid and paratyphoid fever		1		8	6	1		1		17
Whooping cough		3		215	88	28	38	8	8	388

DENMARK

Notifiable diseases—January–March 1940.—During the months of January, February, and March, 1940, cases of certain notifiable diseases were reported in Denmark as follows:

Disease	January	February	March	Disease	January	February	March
Cerebrospinal meningitis	4	6	6	Measles	2,189	2,341	2,426
Chickenpox	1,374	1,120	767	Mumps	266	313	158
Diphtheria	123	77	83	Paratyphoid fever		5	23
Dysentery	17	19	16	Poliomyelitis	2		
Epidemic encephalitis	3	3		Puerperal fever	14	24	32
Erysipelas	371	271	261	Scarlet fever	844	784	676
Gastroenteritis, infectious	1,639	1,735	2,154	Syphilis	41	50	41
German measles	331	623	1,135	Tetanus, neonatorum	6	9	4
Gonorrhea	691	541	543	Typhoid fever	1		
Influenza	15,215	53,716	46,656	Undulant fever	47	44	43
Malaria	1			Weil's disease	2	1	1
				Whooping cough	2,649	1,943	1,627

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–May 1940	June 1940	July 1940—week ended—			
				6	13	20	27
AFRICA							
Union of South Africa:							
Johannesburg	C			5			
ASIA							
China: Shanghai	C		[1] 5	7	8	29	43
India	C	22,493					
Bassein	C	142	22				
Calcutta	C	1,115	411	39	30	45	33
Cawnpore	C	11	5			3	
Chittagong	C	4					
Madras	C	1					
Moulmein	C		16				
Porto Novo	C	1					
Rangoon	C	36	[2] 1	1	3		2
Vizagapatam	C			6	7		3
India (French)	C	34					
Indochina (French)	C	436					
Thailand	C	235					

[1] Includes 2 imported cases.
[2] Imported.

PLAGUE

[C indicates cases; D, deaths]

Place		January–May 1940	June 1940	July 1940—week ended—			
				6	13	20	27
AFRICA							
Belgian Congo	C	12	1				
British East Africa:							
Kenya	C	7					
Uganda	C	94					
Egypt	C	[1] 406	2			1	
Madagascar	C	473					
Morocco.[2]							
Rhodesia, Northern	C	1					
Senegal:							
Dakar	D	[3] 1					
Thies	C	1					
Union of South Africa	C	25					
ASIA							
China.[4]							
Dutch East Indies: Java and Madura	C	209					
India	C	12,457					
Bassein	C	17	1				
Cochin	C	1					
Plague-infected rats		8					
Rangoon	C	4	1				
Indochina (French)	C	3					
Thailand:							
Bangkok	C	8					
Bisnulok Province	C	3					
Dhonpuri Province	C	1					
Jayanad Province	C	3					
Kamphaeng Bajr Province	C	29					

[1] Includes 5 cases of pneumonic plague.
[2] A report dated May 11, 1940, stated that there was an epidemic of bubonic plague in southern Morocco, where several hundred cases had been unofficially reported.
[3] Imported.
[4] Information dated July 7 states that up to July 6, 17 cases of plague had been reported near Tungliao, Hsingan Province, China; and a report dated July 13 states that an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

Place		January-May 1940	June 1940	July 1940—week ended— 6	13	20	27
ASIA—continued							
Thailand—Continued.							
Kanchanapuri Province	C	12					
Koan Kaen Province	C	5					
Nagara Svarga Province	C	30					
Noangkhay Province	C	4					
Sukhodaya Province	C	22					
EUROPE							
Portugal. Azores Islands	C	2					
NORTH AMERICA							
United States. (See p. 1589, and also issues of Aug. 2, p. 1412, and Aug. 9, pp. 1466-1467.)							
SOUTH AMERICA							
Argentina:							
Cordoba Province	C	3	[5] 18				
Jujuy Province	C	1					
Salta Province	C	2					
Santiago del Estero Province	C	14	10				
Tucuman Province	C	4					
Brazil:							
Alagoas State	C	5					
Pernambuco State	C	1					
Peru:							
Cajamarca Department	C	20					
Lambayeque Department	C	10					
Libertad Department	C	44					
Lima Department	C	31					
Piura Department	C	6					
Tumbes Department	C	10					
OCEANIA							
Hawaii Territory: Plague-infected rats		13	6		2	3	5

[5] Includes 11 cases of pneumonic plague.

SMALLPOX

[C indicates cases; D, deaths]

Place		January-May 1940	June 1940	July 1940—week ended— 6	13	20	27
AFRICA							
Algeria	C	5					
Angola	C	35					
Belgian Congo	C	1,709					
British East Africa	C	12					
Dahomey	C	17					
French Guinea	C	13					
Gibraltar	C	[1] 1					
Ivory Coast	C	113					
Nigeria	C	1,608	145				
Niger Territory	C	594					
Nyasaland	C	46					
Portuguese East Africa	C	1					
Rhodesia, Southern	C	183					
Senegal	C	131					
Sierra Leone	C	10					
Sudan (Anglo-Egyptian)	C	383	27		6	8	17
Sudan (French)	C	1					
Union of South Africa	C	82	3				
ASIA							
Arabia	C	255					
China	C	664	110	5	5	3	1
Chosen	C	533					
Dutch East Indies—Sabang	C	4					
India	C	108,319		550	440	976	257
India (French)	C	5					

[1] Imported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths]

Place		January-May 1940	June 1940	July 1940 week ended— 6	13	20	27
ASIA—continued							
India (Portuguese)	C	24					
Indochina (French)	C	843					
Iran	C	151					
Iraq	C	135	28	3			2
Japan	C	527					
Straits Settlements	C	1					
Sumatra	C	1					
Thailand	C	12	2	18	11	27	
EUROPE							
Great Britain	C	2					
Greece	C	19					
Portugal	C	112	11	2	1		
Spain	C	314	2				
Turkey	C	139					
NORTH AMERICA							
Guatemala	C	1	16				
Mexico	C	52					
SOUTH AMERICA							
Bolivia	C	24					
Brazil	C	1					
Colombia	C	970	4		1		
Ecuador	C	1					
Peru	C	6					
Venezuela (alastrim)	C	128	6				

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January-May 1940	June 1940	July 1940 week ended— 6	13	20	27
AFRICA							
Algeria	C	1,509	143		43		
Belgian Congo	C	1,210					
British East Africa	C	2					
Egypt	C	3,117	262	4	47	33	28
Eritrea	C	40					
Morocco	C	271	3				
Tunisia	C	515					
Union of South Africa	C	105	2				
ASIA							
China	C	1,278	448	63	30		
Chosen	C	156					
India	C	3					
Indochina (French)	C	2					
Iran	C	233					
Iraq	C	80	22	1		5	2
Japan	C	2					
Palestine	C	43	10	3	4	3	7
Straits Settlements	C	1	2				
Trans-Jordan	C	15					
EUROPE							
Bulgaria	C	85	9				
Germany	C	120	9				
Greece	C	24	1				
Hungary	C	69	5				1
Irish Free State	C		6			8	
Lithuania	C	59					
Rumania	C	1,092	86	1	7	6	5
Spain	C	9	5				
Turkey	C	503					
Yugoslavia	C	233	9				
NORTH AMERICA							
Guatemala	C	211	16				
Mexico	C	168				1	
Panama Canal Zone	C	8					

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths]

Place		January–May 1940	June 1940	July 1940—week ended— 6	13	20	27
SOUTH AMERICA							
Bolivia	C	165					
Chile	C	57	3				
Ecuador	C	2					
Peru	C	197					
Venezuela	C	8					
OCEANIA							
Australia	C	10					
Hawaii Territory	C	13	3			1	

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–May 1940	June 1940	July 1940—week ended— 6	13	20	27
AFRICA							
Cameroon: Nkongsamba	C	[1] 1					
French Equatorial Africa: Fort Archambault	C	[1] 1					
Gold Coast	C	1					
Ivory Coast	C	1					
Nigeria:							
Ibadan	C		1				
Oshogbo	C	[1] 1					
Oyo Province	C		1				
Togo (French)	C		1				
SOUTH AMERICA							
Brazil:							
Espirito Santo State	D	[2] 28					
Rio de Janeiro State	D	[2] 1					
Colombia:							
Antioquia Department—San Luis	D	2					
Caldas Department—							
La Pradera	D	1					[2] 1
Samana	D	1					
Victoria	D	1					
Santander Department	D					1	

[1] Suspected.
[2] Jungle type.

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Public Health Reports

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IN THIS ISSUE

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UNITED STATES PUBLIC HEALTH SERVICE

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CONTENTS

Public Health Reports

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RHEUMATIC HEART DISEASE IN PHILADELPHIA HOSPITALS[1]

A Study of 4,653 Cases of Rheumatic Heart Disease, Rheumatic Fever, Sydenham's Chorea, and Subacute Bacterial Endocarditis Involving 5,921 Admissions to Philadelphia Hospitals, From January 1, 1930, to December 31, 1934

By O. F. Hedley, *Surgeon, United States Public Health Service*

INTRODUCTION

An analysis of the hospital records of 4,653 cases of rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis, covering the years 1930–34, has been undertaken in order to obtain as accurate a picture as possible of diseases generally ascribed to rheumatic infection.

Among the chief difficulties attending studies of rheumatic conditions are the lack of standardization in the nomenclature of these diseases, lack of a satisfactory generic term embracing all conditions included in this group, the high degree of overlapping of rheumatic fever, Sydenham's chorea, and rheumatic heart disease, and the common occurrence of a number of complicating factors, some of which may be considered as distinct clinical entities.

There is no entirely satisfactory term for describing rheumatic fever, Sydenham's chorea, and rheumatic heart disease as a whole. Rheumatic heart disease often occurs without clinically demonstrable rheumatic fever. Not infrequently signs of heart disease develop prior to arthritic phenomena. Since heart disease is the most important and most frequent single manifestation of the rheumatic syndrome, it cannot be regarded as a complication or sequella of rheumatic fever. The term "rheumatic infection" is not wholly descriptive or sufficiently inclusive since Sydenham's chorea, conceded by most students of the problem to be a manifestation of the rheumatic syndrome, may occur without detectable signs of infection. Well-developed rheumatic heart disease, such as mitral stenosis, often occurs without a demonstrable antecedent history of infection. Per-

[1] From the Division of Infectious Diseases, National Institute of Health.

haps the term which best describes the condition as a whole is "rheumatic state," an expression used by Coburn (*1*). Its chief advantage is that it is noncommittal concerning the role of infection, and its chief drawback is that it is an awkward expression.

In these articles rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis engrafted on rheumatic heart disease will be referred to as "rheumatic conditions," though this term is admittedly far from satisfactory. The word "rheumatic" means different things to different persons. To the pathologist it implies conditions of the joint cavities unattended by destructive processes, in contradistinction to arthritic processes which are essentially destructive lesions. Even here is encountered the twilight zone of "rheumatoid arthritis." To the pediatrician, especially those in Great Britain, "rheumatic" is limited to the description of rheumatic fever, rheumatic carditis, and Sydenham's chorea of childhood, the problem as a whole often being referred to as "juvenile rheumatism." To the student of arthritic diseases "rheumatic" or "rheumatism" is used to cover the entire problem of arthritic diseases, rheumatic fever, lumbago, and even gout. To the layman "rheumatism" generally means any ache or pain involving muscles, joints, bones, and at times even the nervous system. The latter conception at least has the merit of relative clarity.

Rheumatic heart disease is the most frequent and most devastating rheumatic condition. From both the clinical and public health points of view it constitutes the core of the problem. Rheumatic fever without heart disease is usually a self-limited disease which rarely results in permanent damage even to the joint cavities. Its clinical phenomena can usually be controlled by the use of appropriate analgesics and antipyretics. Simple Sydenham's chorea is a distressing disease often of long duration, confined for the most part to persons in the second and third quinquennia of life. It very rarely causes death and only occasionally leaves permanent sequellae. The chief source of concern is the cardiac involvement which so frequently develops during the course of or subsequent to rheumatic fever and chorea.

Compared to most disease conditions a study of rheumatic infections offers many perplexities. A writer dealing with acute communicable diseases and such diseases as tuberculosis, syphilis, most metabolic diseases, and even nervous and mental disorders and malignant tumors, is able to describe and usually define the condition under study in its entirety, or to limit study to involvement of a single organ or to a commonly recognized clinical manifestation. In a study of rheumatic conditions such a consideration is hardly possible, owing to the many permutations and combinations of diseases, complications, and sequellae of both fatal and nonfatal cases. It is therefore necessary to

consider rheumatic heart disease, rheumatic fever, and chorea not only as separate clinical entities but in various combinations.

There is also the important problem of subacute bacterial endocarditis. This highly fatal disease often occurs as a definite complication of rheumatic heart disease while in many other cases a relationship between these diseases is suspected but cannot be proved even on the basis of necropsy findings. Clinically rheumatic heart disease and subacute bacterial endocarditis often have much in common. Sometimes the transition from what is apparently rheumatic fever to subacute bacterial endocarditis is so gradual that the change cannot readily be observed.

Sydenham's chorea is a nervous manifestation whose exact relationship to other rheumatic conditions is imperfectly understood, and under certain conditions disputed. Its morbid anatomy is very imperfectly understood. Rheumatic fever may vary in intensity from mild joint and muscular pains to severe migrating polyarthritis. Signs of systemic infection in rheumatic fever run the entire gamut of severity from the barely detectable to the rapidly overwhelming. Cardiac involvement varies in degree and extent. These statements, however, should not be interpreted as indicating a state of diagnostic nihilism; rheumatic conditions seen in hospital practice are usually of sufficient severity and of a sufficiently characteristic clinical picture to be diagnosed with a high degree of accuracy.

This study constitutes the first attempt to depict rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis as hospital problems in a large city over a period of several years. Since the discovery of the relationship of rheumatic fever to heart disease, many excellent studies have been made. With few exceptions they have dealt with isolated aspects of the problem or with limited age groups. Even when patients of all ages were studied, the results were likely to be influenced by peculiarities in the composition of the case load of a given hospital. Consequently the results have tended to be fragmentary. Students of rheumatic infection among children have even gone so far as to designate it as "juvenile rheumatism" as though it were separate and apart from the problem as a whole, while writers dealing with rheumatic valvular diseases have often been so engrossed in the mechanical effects of these lesions on the circulatory system that they have failed to give due recognition to the significance of rheumatic infection in adult life.

The findings of the present study have been arranged in five parts:

Part I. Rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis as a hospital problem.

Part II. Age, race, and sex distribution and interrelation of rheumatic fever, Sydenham's chorea, rheumatic heart disease, and subacute bacterial endocarditis.

Part III. Fatal rheumatic heart disease and subacute bacterial endocarditis.

Part IV. Influence of season and certain meteorological conditions.

Part V. Distribution by locality of rheumatic conditions in Philadelphia.

Parts II, III, IV, and V will be published in succeeding issues of Public Health Reports.

I. RHEUMATIC HEART DISEASE, RHEUMATIC FEVER, SYDENHAM'S CHOREA, AND SUBACUTE BACTERIAL ENDOCARDITIS AS A HOSPITAL PROBLEM

This study, made during 1935, consists in an analysis of the records of 4,653 cases of rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis involving 5,921 admissions to Philadelphia hospitals during the 5-year period from January 1, 1930, to December 31, 1934. Considerable improvement was noted during the period under study in the diagnosis of rheumatic conditions and in terminology used to describe them. This was aided in no small measure by the widespread adoption by hospitals in Philadelphia of the nomenclature of the American Heart Association. Future studies will be greatly facilitated, since most hospitals in this area are now diagnosing heart disease on the basis of etiology.

Owing to lack of standardization in the nomenclature of these diseases, a matter commented upon by Paul (*2*), it was necessary to review records involving a number of other conditions, such as valvular heart disease, mitral stenosis, mitral insufficiency, all forms of endocarditis, pericarditis, pancarditis, acute articular rheumatism, rheumatic arthritis, and, sometimes, myocarditis. Many of these records were rejected after review since they apparently described other kinds of heart disease than rheumatic heart disease or subacute bacterial endocarditis.

It is believed that the 4,653 cases included in this series represent the minimum number of cases of rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis in Philadelphia hospitals during this period. In reviewing hospital records, care was taken to limit the series to cases which definitely appeared to fit into the pattern of these conditions. With more liberal selection more cases would have been included, but the opportunity for error would have been greatly enhanced. With a policy of conservatism in selection, the series is smaller but probably more accurate.

ADMISSIONS STUDIED

Practically all hospital statistics are based on the number of admissions and on admission rates. From a strictly scientific point of view this is not as accurate in many instances as statistics based on individual cases. From the hospital viewpoint the number of admissions is of greater importance than the number of cases since it is the number of admissions and duration of hospitalization which determines the importance of a disease as a hospital problem.

TABLE 1.—*Number of admissions and percentage of total admissions with rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis in 36 civilian hospitals in Philadelphia from January 1, 1930, to December 31, 1934*

	Number of admissions	Percentage of total admissions
Admissions from all causes (1930–34)	850, 423	
Total admissions with rheumatic infections and subacute bacterial endocarditis	5, 921	0.70
All rheumatic infections	5, 801	.68
Rheumatic heart disease	4, 869	.57
Rheumatic fever with rheumatic heart disease	960	.11
Sydenham's chorea with rheumatic heart disease	[1] 362	.04
Rheumatic heart disease complicated by subacute bacterial endocarditis	223	.03
Uncomplicated rheumatic heart disease	3, 354	.39
Rheumatic fever without heart disease	499	.06
All rheumatic fever	1, 459	.17
Sydenham's chorea without heart disease	[2] 444	.05
All Sydenham's chorea	806	.09
Subacute bacterial endocarditis not superimposed on rheumatic heart disease	120	.01
All subacute bacterial endocarditis	343	.04

[1] Including 30 in which rheumatic fever and chorea occurred during same admission.
[2] Including 11 in which rheumatic fever and chorea occurred during same admission.

Altogether, there were 5,921 admissions for rheumatic conditions and subacute bacterial endocarditis. Of this number, 5,801, or 98 percent, definitely had some form of rheumatic infection while 120, or 2 percent, had subacute bacterial endocarditis apparently not engrafted on rheumatic heart disease (table 1).

Of the 5,801 admissions with rheumatic conditions, 4,869, or 83.9 percent, had some form of rheumatic heart disease. Of this number, 223, or 4.6 percent, had subacute bacterial endocarditis engrafted on rheumatic heart disease, while 4,646, or 95.4 percent, had rheumatic heart disease without this complication. Among 4,869 admissions with rheumatic heart disease, 3,354, or 68.9 percent, had rheumatic heart disease uncomplicated by rheumatic fever, chorea, or subacute bacterial endocarditis.

Of the 5,801 admissions with rheumatic conditions, 960, or 16.5 percent, had rheumatic fever with rheumatic heart disease, while 499, or 8.6 percent, had rheumatic fever without clinically recognized heart disease. Altogether, 1,459, or 25.2 percent, had rheumatic fever. Sydenham's chorea was present in a total of 806 admissions, or 13.9 percent, of the total with rheumatic infection. Of the 5,801 admis-

sions 444, or 7.7 percent, had simple Sydenham's chorea without clinical evidence of heart disease, while 362, or 6.2 percent, had chorea with rheumatic heart disease. There were 41 admissions in which both rheumatic fever and chorea occurred. These were considered as separate entities and for this reason the items in table 1 overlap to a certain extent.

Subacute bacterial endocarditis engrafted on rheumatic heart disease occurred in 223, or 3.8 percent, of the 5,801 admissions with rheumatic conditions. In addition, there were 120 admissions with subacute bacterial endocarditis not engrafted on rheumatic heart disease, or in which the relationship between these conditions was not definitely established. It is probable that in some of these a rheumatic background was present. Subacute bacterial endocarditis was included because it often occurs as a complication of rheumatic heart disease, and because opportunity is afforded to compare certain features of subacute bacterial endocarditis with a known rheumatic background with cases in which the relationship is not proved. Subacute bacterial endocarditis apparently not engrafted on rheumatic heart disease constitutes only 2.0 percent of the 5,921 admissions in this series and consequently does not influence it to any great extent.

RELATION OF ADMISSIONS TO NUMBER OF INDIVIDUAL CASES

There were 5,921 admissions of 4,653 patients during this 5-year period, or 1.27 admissions per patient. Even over such a relatively long period this does not represent an entirely accurate index of the number of admissions for each patient. Many of these patients were admitted to hospitals only as a final resort and either died in hospital or soon after discharge. The natural history of rheumatic heart disease covers such a long period that frequently a patient is admitted for rheumatic fever or chorea in childhood and not readmitted for congestive failure or subacute bacterial endocarditis until perhaps 20 to 30 years later.

According to table 2, 81.7 percent were admitted only once during the period under study. Comparatively few patients were admitted more than four times. Most of those admitted more than four times had well-developed valvular heart disease with frequent breakdowns from congestive failure. Many had been hospitalized on several other occasions before this study began, while others continued to be hospitalized after the completion of the 5 years under study.

This type of patient, suffering from the end-results of rheumatic heart disease, sometimes lives for several years on the verge of congestive heart failure. From social and economic standpoints this constitutes one of the most distressing features of rheumatic heart disease. These persons are generally unable to pursue a gainful occupation or their home duties, except in a very limited capacity. Not only is the

community burdened with the cost of frequent hospitalizations and the expense of furnishing medical care during the interim between admissions, but financial assistance is frequently necessary, especially if it is the breadwinner of a family who is afflicted. When the mother or some other member is the victim, the family may have to readjust its mode of living. Frequently a wage earner has to stay at home. Sometimes the family has to live in a first-floor flat to save the patient from the exertion of stair climbing.

TABLE 2.—*Numerical relationship of cases to admissions among 4,653 persons with rheumatic heart disease, rheumatic fever, Sydenham's chorea and subacute bacterial endocarditis admitted 5,921 times to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Number of patients	Times admitted	Total admissions
3,804	1	3,804
595	2	1,190
171	3	513
53	4	212
18	5	90
4	6	24
3	7	21
1	8	8
2	9	18
1	20	20
1	21	21
4,653		5,921

Two of the patients were admitted 20 or more times during these 5 years. One was a colored woman in the 35–40-year age group who was admitted 21 times for congestive failure. The other was a white female in the 40–45-year age group who had to be admitted periodically for paracenteses and thoracenteses. In addition to rheumatic heart disease with mitral stenosis and aortic insufficiency she probably had an adherent pericardium. She also had auricular fibrillation and frequently showed peripheral signs of congestive failure. She may also have had cirrhosis of the liver, either primary or due to long-standing hepatic congestion. Both of these patients died before the completion of the 5-year period.

These cases illustrate the difficulties attending an analysis of results solely on the basis of admissions, especially when dealing with age, race, and sex distribution, or the occurrence of certain clinical phenomena such as auricular fibrillation. This will be discussed in greater detail in a subsequent section describing certain clinical features of rheumatic infection in Philadelphia.

ADMISSIONS FROM ALL CAUSES WITH RHEUMATIC CONDITIONS AND SUBACUTE BACTERIAL ENDOCARDITIS

Among 850,423 admissions from all causes in 36 civilian hospitals in Philadelphia during the 5-year period under study, rheumatic con-

admissions, or 0.70 percent (see table 1). Excluding 120 admissions for uncomplicated subacute bacterial endocarditis, rheumatic infection was present in 5,801 admissions, or 0.68 percent of admissions from all causes. Rheumatic heart disease was noted in 4,869 admissions, or 0.57 percent of the total admissions. There were 1,459 admissions for rheumatic fever with or without heart disease, or 0.17 percent of admissions from all causes. Sydenham's chorea was present in 0.09 percent of the total admission load during this period. Subacute bacterial endocarditis was present in 343, or 0.04 percent of all admissions. Most of the subacute bacterial endocarditis was on a rheumatic basis.

TABLE 3.—*Percentage of total admissions involving rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis in various types of hospitals in Philadelphia from January 1, 1930, to December 31, 1934*

Status of hospital	Number of hospitals	Admissions from all causes	Admissions with rheumatic conditions and subacute bacterial endocarditis	Percentage of admissions with rheumatic conditions and subacute bacterial endocarditis
Hospitals approved for interneship by American Medical Association	26	784,787	5,009	0.64
Hospitals with medical school affiliation [1]	14	503,661	3,984	.79
Hospitals with cardiac clinics	22	655,519	4,872	.74
Hospitals without cardiac clinics	14	194,904	1,050	.54
Hospitals not approved for interneship and without medical school affiliation	6	38,249	147	.38
Children's hospitals	3	27,042	421	1.56

[1] Limited to hospitals used for undergraduate or graduate teaching of general medicine, heart disease, or pediatrics.

Of the 5,921 admissions for these diseases, 5,009 occurred in 26 hospitals (table 3) approved for interneship by the American Medical Association. In these hospitals, rheumatic conditions and subacute bacterial endocarditis occurred in 0.64 percent of all admissions. In the 3 children's hospitals these diseases were present in 1.56 of admissions from all causes. In 14 hospitals used by the 5 medical schools in this city for undergraduate or graduate instruction in general medicine, heart disease, and pediatrics, these diseases were indicated in 0.79 percent of the total admissions. In 22 hospitals with heart clinics approved by the American Heart Association these diseases were present in 0.74 percent of all admissions. In 6 hospitals not approved for interneship and not affiliated with medical schools these diseases were present in only 0.38 percent of admissions from all causes.

The higher incidence in children's hospitals is due to the increased susceptibility of children to rheumatic infection. Since most admis-

sions to children's hospitals are of very short duration, especially for tonsillectomies, the significance of rheumatic disease in childhood as a hospital problem is even greater than these figures indicate.

Of the 5,921 admissions involving these conditions, 67.3 percent were to hospitals with medical school affiliation, while 84 6 percent were to hospitals approved for interneship by the American Medical Association. The higher incidence of rheumatic infection in these hospitals and in hospitals with cardiac clinics is due to better diagnosis, together with an increasing tendency to refer patients from out-patient departments, particularly cardiac clinics, to hospitals before serious complications develop. These hospitals almost all have large public wards and receive State aid or gifts from religious or other benevolent organizations. Consequently they are able to furnish hospitalization free of charge or for nominal fees to needy persons.

Most of the hospitals in Philadelphia not recognized for interneship by the American Medical Association are small private hospitals. These hospitals generally specialize in surgical cases. They usually have small or poorly organized out-patient departments, and small pediatric services. They do not treat many charity cases.

There was considerable difference in the percentage of total admissions with rheumatic infection and subacute bacterial endocarditis in various hospitals (table 4). Large general hospitals and children's hospitals in the center of the city had the highest percentages of admissions, and most of the admissions were to these hospitals. At the Philadelphia General Hospital 0.79 percent of all admissions had rheumatic conditions or subacute bacterial endocarditis, while nearly 15 percent of all admissions with these diseases in the entire city were to this institution. At the Pennsylvania Hospital, 1.09 percent of all admissions, the highest incidence of any general hospital in the city, had these diseases. This hospital is located in the oldest and one of the poorest sections of the city. It has large public wards and treats many Negroes, and white persons of Italian and Russian birth or extraction, many of whom are extremely poor. It has an unusually large and active cardiac clinic and its staff is very much interested in cardiac conditions.

The Children's Hospital had the highest incidence of admissions, 1.8 percent, of any hospital in the city. This institution is located in one of the poorest sections of Philadelphia. During the economic depression very few private beds were filled. Its cardiac clinic treats many patients with rheumatic heart disease, and the clinic chief is a diligent student and earnest research worker in the field of heart disease in children.

TABLE 4.—*Distribution by hospitals of 5,921 admissions with rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis occurring in Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Name of hospital	Admissions from all causes during 5-year period	Number of admissions with rheumatic heart disease, rheumatic fever, chorea, and subacute bacterial endocarditis	Percentage of total admissions due to rheumatic conditions and subacute bacterial endocarditis	Percentage admissions for rheumatic conditions and subacute bacterial endocarditis in each hospital
Babies [5]	1,377	1	0.07	0.02
Broad Street	7,301	7	.10	.12
Chestnut Hill [1]	10,509	83	.31	.56
Children's Heart [2]	845	345	100 00	5 83
Children's [2,3,4]	11,160	201	1.80	3.39
Frankford [1,4]	16,332	138	.81	2.33
Frederick Douglass	3,001	15	.50	.25
Germantown [1,4]	32,489	128	.39	2.16
Graduate [1,2,4]	41,201	288	.70	4.86
Hahnemann Medical College [1,2]	54,349	295	.54	4.98
Jefferson Medical College [1,2,4]	67.298	352	.52	5.95
Jewish [1,2,4]	34,188	193	.56	3.26
Lankenau [1,4]	19,157	111	.58	1.87
Mary Drexel [2,3,4]	5,097	65	1 28	1.10
Mercy [1]	8,837	29	.35	.49
Methodist [1]	23,757	84	.35	1 42
Misericordia [1,4]	23 365	251	1.07	4 24
Mount Sinai [1,4]	31,309	305	.97	5.15
Northeastern [1]	11,140	96	.86	1.62
Northern Liberties [4]	8,688	70	.81	1.18
Pennsylvania [1,2,4] and Maternity	49,410	541	1.09	9 14
Philadelphia General [1,2,4]	112,214	884	.79	14.93
Presbyterian [1,4]	22,640	188	.83	3.18
Protestant Episcopal [1,4]	29,429	214	.73	3.61
Roxborough [4]	11,141	38	.34	.64
St. Agnes [1]	24,801	68	.25	1.06
St. Christopher's [2,3,4]	10,779	155	1.44	2.62
St. Joseph's [1]	13,019	22	.17	.37
St. Luke's [1,2,4]	17,923	105	.59	1.77
St. Mary's [1]	17,246	20	.12	.34
Stetson	6,741	16	.24	.27
Temple University [1,2,4]	42,011	228	.54	3.85
University of Pennsylvania [1,2,4]	44,937	239	.53	4.04
Women's [1,4]	12,002	85	.71	1.44
Women's Homeopathic [1]	12,981	24	.18	.41
Women's Medical College [1,2,4]	12,148	92	.76	1.55
Total	850,123	5,921	.70	100.00

[1] Hospitals approved for interneship by American Medical Association.
[2] Hospitals used for graduate or undergraduate medical instruction in medicine or pediatrics.
[3] Children's hospitals, exclusive of special institutions.
[4] Hospitals with heart clinics.
[5] Limited to infants. Bed capacity of only 15 beds.

Most of the hospitals approved for interneship with lower incidences of admissions involving rheumatic conditions and subacute bacterial endocarditis are either located in the outskirts of the city or are under religious denominational control. Hospitals under church control do not receive a per diem allowance from the State for hospitalizing free patients. Therefore, while they are able to furnish many persons with hospitalization at low rates or free of charge they do not treat as large a proportion of indigent persons as hospitals receiving a per diem allowance from the Commonwealth of Pennsylvania for the care of its indigent citizens. Consequently, not as many cases of these diseases were treated in denominational institutions. The Misericordia Hospital, however, was an exception. In this hospital, 1.07 percent of all admissions were due to these causes, despite the fact that

it does not receive State aid and is located in one of the better residential sections in West Philadelphia. The high incidence of admissions is probably due in no small measure to the keen interest of at least one of the members of its staff.

TABLE 5.—*Principal causes for 5,921 admissions involving rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis in 36 civilian hospitals in Philadelphia, from January 1, 1930, to December 31, 1934*

Diagnosis	All causes		Rheumatic conditions		Subacute bacterial endocarditis		Other medical conditions		Surgical conditions		Obstetrics		Tonsillectomies	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total admissions with rheumatic conditions and subacute bacterial endocarditis	5,921	100	5,161	87.2	343	5.8	76	1.3	142	2.4	120	2 2	70	1.2
All rheumatic conditions	5,801	100	5,161	89.0	223	3.9	76	1.3	142	2.4	129	2 2	70	1.2
Rheumatic heart disease	4,869	100	4,234	87.0	223	4.6	75	1.6	138	2.8	120	2.6	70	1.4
Rheumatic fever with rheumatic heart disease	960	100	958	99.8	0	0	0	0	0	0	2	.2	0	0
Sydenham's chorea with rheumatic heart disease	[1] 332	100	330	99.4	0	0	0	0	0	0	2	.6	0	0
Rheumatic heart disease complicated by subacute bacterial endocarditis	223	100	0	0	223	100	0	0	0	0	0	0	0	0
Uncomplicated rheumatic heart disease	3,354	100	2,946	87.8	0	0	75	2.2	138	4.2	125	3.7	70	2.1
Rheumatic fever without heart disease	499	100	495	99.2	0	0	0	0	4	.8	0	0	0	0
All rheumatic fever	1,459	100	1,457	99.9	0	0	0	0	0	0	2	.1	0	0
Sydenham's chorea without heart disease	[1] 433	100	432	99.8	0	0	1	.2	0	0	0	0	0	0
All Sydenham's chorea	[1] 765	100	762	99.6	0	0	1	.1	0	0	2	.3	0	0
Subacute bacterial endocarditis not engrafted on rheumatic heart disease	120	100	0	0	120	100	0	0	0	0	0	0	0	0
All subacute bacterial endocarditis	343	100	0	0	343	100	0	0	0	0	0	0	0	0

[1] 41 with rheumatic fever and chorea during same admission counted as rheumatic fever.

MEDICAL ADMISSIONS WITH RHEUMATIC CONDITIONS

During 1928, 2 years before the beginning of this series, an exhaustive study of Philadelphia hospitals was conducted under the direction of Dr. Haven Emerson (*3*). This survey indicated that only 26 percent of the total admissions to 29 general hospitals were for medical conditions, in contradistinction to admissions for surgical, obstetrical, and other causes. Only 27 percent of admissions to 3 children's hospitals were for medical conditions. Based on this survey, it is estimated that rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis were present in 2.4 percent of medical admissions to general hospitals, and in 5.8 percent of medical admissions to children's hospitals.

PRINCIPAL CAUSES OF ADMISSIONS

Rheumatic heart disease, rheumatic fever, and Sydenham's chorea were the principal causes of 87.2 percent of 5,921 admissions involving these conditions to Philadelphia hospitals during 1930–34. Subacute bacterial endocarditis accounted for 5.8 percent of these admissions. Rheumatic conditions and subacute bacterial endocarditis therefore accounted for 93 percent of all admissions involving this group of diseases.

Only 1.2 percent were admitted for tonsillectomies. This does not imply that tonsillectomies were performed on only 1.2 percent of the cases of rheumatic heart disease hospitalized during this period. In many cases tonsillectomies were performed, but the primary cause for admission was some form of rheumatic infection.

Medical problems other than rheumatic fever, Sydenham's chorea and rheumatic heart disease were the principal causes of 1.3 percent of the 5,921 admissions involving these conditions. This low percentage probably results from the fact that a number of these patients were acutely ill with such conditions as pneumonia, diabetic acidosis, blood dyscrasias, acute infectious diseases, and other conditions which tend to mask signs of heart disease, or else exigencies prevented more than a casual examination of the heart.

General surgical conditions were the primary causes of 2.4 percent of these 5,921 admissions, while another 2.2 percent were obstetrical admissions. This would have been increased had hospitals devoted entirely to maternity care been included in this series. Because of unusually obsolete terminology and inadequate cross-indexing of diagnoses it was extremely difficult to obtain the records of maternity cases with heart disease, even in general hospitals. Often the reference to the cardiac condition was so short that it was not possible to be certain that the heart disease was of the rheumatic type. Only 2 cases of chorea gravidarum were admitted. In both an associated cardiac lesion was present.

With the exception of subacute bacterial endocarditis, rheumatic conditions were the principal reasons for admission in all of the categories listed in table 5. Of the 4,869 admissions with rheumatic heart disease, 87.0 percent were for rheumatic heart disease and 4.6 percent for complicating subacute bacterial endocarditis. Altogether, 91.6 percent were directly or indirectly attributable to rheumatic infection. Of the 1,459 admissions for rheumatic fever with or without heart disease, 99.9 percent were for rheumatic conditions, while of 765 admissions for Sydenham's chorea with or without heart disease, 99 6 percent were for rheumatic conditions including chorea.

RELATION OF PRIVATE TO WARD ADMISSIONS

According to table 6, 93.2 percent of 5,921 admissions for rheumatic conditions and subacute bacterial endocarditis during this period were to the wards of general and children's hospitals. Of the 5,801 admissions with rheumatic conditions, 93.3 percent were ward patients. Of the 4,869 admissions with rheumatic heart disease 93.4 percent occupied ward beds. Of 1,459 admissions with rheumatic fever with or without rheumatic heart disease, 93.1 percent were to the wards, while 97.5 percent of admissions with chorea were ward patients. These figures substantiate the general impression that rheumatic fever, Sydenham's chorea, and rheumatic heart disease are essentially problems of the class of patients encountered on the wards of general and children's hospitals. The ratio of ward to private admissions is approximately 15:1.

TABLE 6.—*Type of bed occupied (ward or semiprivate and private) during 5,921 admissions with rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis from January 1, 1930, to December 31, 1934*

Diagnosis	Total		Bed occupied					
			Ward		Private or semiprivate		Status unknown	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total admissions with rheumatic conditions and subacute bacterial endocarditis	5,921	100	5,520	93.2	395	6.7	6	0.1
All rheumatic infections	5,801	100	5,416	93.3	380	6.5	5	.1
Rheumatic heart disease	4,869	100	4,549	93.4	315	6.5	5	.1
Rheumatic fever with rheumatic heart disease	960	100	912	94.9	46	4.8	2	.2
Sydenham's chorea with rheumatic heart disease	332	100	325	97.9	7	2.1	0	0
Rheumatic heart disease complicated by subacute bacterial endocarditis	223	100	196	87.9	27	12.1	0	0
Uncomplicated rheumatic heart disease	3,354	100	3,116	92.9	235	7.0	3	.1
Rheumatic fever without heart disease	499	100	446	89.4	53	10.6	0	0
All rheumatic fever	1,459	100	1,358	93.1	99	6.8	2	.1
Sydenham's chorea without heart disease	[1] 433	100	421	97.2	12	2.8	0	0
All Sydenham's chorea	[1] 765	100	746	97.5	19	2.5	0	0
Subacute bacterial endocarditis not engrafted on rheumatic heart disease	120	100	104	86.7	15	12.5	1	.8
All subacute bacterial endocarditis	343	100	300	87.5	42	12.2	1	.3

[1] 41 with rheumatic fever and chorea during same admission counted as rheumatic fever.

One of the principal reasons for this is the very long duration of hospitalization required, the total cost of which few people can afford. Rheumatic heart disease occupies an intermediary position with regard to chronicity. Longer periods of hospitalization are required than for most surgical conditions, acute infectious diseases, and even most other forms of heart disease, but not so long as for tuberculosis, many cases of cancer, and nervous and mental diseases. The fact that rheumatic heart disease attacks the young should be taken into account since the wage earner of the family is not as likely to be affected as in some other conditions.

A somewhat lower percentage of ward admissions was indicated among patients with subacute bacterial endocarditis. Of all admissions for this condition 87.5 percent were ward patients. Practically the same percentage of ward patients obtained regardless of a definite rheumatic background. The slightly lower percentage of ward admissions is probably due to the fact that relatively more people in better economic circumstances succumb to this condition. Subacute bacterial endocarditis is often engrafted on a minor grade of rheumatic heart disease which has not previously incapacitated the patient.

Over 90 percent of the white patients were treated in hospital wards, while 100 percent of the colored patients received ward care. Emerson (3), in 1928, found that 35 percent of patients admitted to general hospitals occupied private or semiprivate rooms while 65 percent were admitted to the wards. Even though there has been a certain decrease because of the economic depression in the scale of beds occupied, it remains apparent that rheumatic heart disease, rheumatic fever, and Sydenham's chorea are diseases preponderantly encountered on hospital wards. Practical experience with a number of the patients included in this series and other cases makes it difficult to believe that even in relatively prosperous years many of these patients have ever been above the economic level of those commonly seen on the wards of general hospitals.

ANNUAL ADMISSIONS

A considerable increase in total admissions from these causes and in the percentage of these admissions among admissions from all causes was indicated during the first 3 years under study (table 7). After this, only slight annual fluctuations occurred. During 1932-34 the percentage of the 5,921 admissions during each year under study varied less than 0.5 percent annually. On the basis of the number of admissions during the last 3 years of the study, the total number of admissions to Philadelphia hospitals involving these conditions is probably slightly in excess of 1,200 per year.

In addition to computing admissions on the basis of total admissions with rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis, consideration was given to the number of initial admissions during the period under study. This is based on the number of new cases added to the series each year and its total approximates the number of cases in contradistinction to the number of admissions. The initial admissions were not necessarily the first admissions since many had been admitted prior to 1930. During the last 3 years initial admissions to the series approximate quite closely the true incidence of first admissions, with the exception of patients who were admitted for advanced rheumatic

heart disease, including subacute bacterial endocarditis, but who gave a history of previous hospitalization years ago for rheumatic fever or chorea. Since a considerable number of the adult population of Philadelphia is foreign born or, in the case of the Negro population, has migrated from the Southern States, previous admissions in the distant past were often to hospitals outside of this city.

TABLE 7.—*Percentage of admissions with rheumatic infections and subacute bacterial endocarditis among admissions from all causes in each year under study during 1930–34 in Philadelphia hospitals, based on total admissions from these causes and initial admissions from these causes during the period under study; also percentage of admissions from these causes during each year*

Year	All admissions	Total admissions with rheumatic conditions and subacute bacterial endocarditis	Percentage of all admissions	Initial admissions with rheumatic conditions and subacute bacterial endocarditis	Percentage of all admissions	Percentage of total admissions with rheumatic conditions and subacute bacterial endocarditis each year
1930	176,521	995	0.56	884	0.50	16.9
1931	169,045	1,158	.69	942	.56	19.7
1932	169,803	1,240	.73	949	.55	21.1
1933	172,121	1,258	.73	928	.54	21.4
1934	162,993	1,230	.75	912	.57	20.9
Total	850,423	[1] 5,881	.69	[2] 4,615	.54	100.0

[1] In 40 admissions the year was not determined.
[2] In 38 cases the year of initial admission was not determined.

On the basis of initial admissions during this period, only slight annual variations in the number of admissions and percentage of total admissions were noted (table 7). The lowest number, 884 initial admissions, occurred during 1930. This low number is probably attributable to difficulties in obtaining records owing to the lapse of time between 1930 and the beginning of the survey, to misplaced records, and to changes in diagnostic terminology and filing systems. The highest number, 949 initial admissions, occurred during 1932. During 1934, the last year under study, there was a slight decline to 912 new admissions. Since it is unlikely that many of the admissions added to this series during 1934 had been hospitalized prior to 1930, there are probably about 900 new admissions involving these conditions each year in Philadelphia hospitals.

ESTIMATED PATIENT-DAYS

Unfortunately, at the time this survey was made the number of days of hospitalization was not determined. In an endeavor to obtain an estimate of the duration of admissions from the diseases under study, the mean duration of 1,431 admissions for these conditions was ascertained. These included 834 admissions for rheumatic heart disease, 284 for rheumatic fever with or without heart disease, 163 for chorea with or without heart disease, and 150 for subacute bacterial endocarditis. This information was obtained from 12 large gen-

eral and 2 large children's hospitals. The number of admissions from each hospital was roughly prorated on the basis of its total number of admissions for rheumatic conditions. The mean days duration of hospitalization for rheumatic conditions, including subacute bacterial endocarditis, was estimated at 41 days This was exclusive of admissions to the Children's Heart Hospital, which averaged 178 days. The mean duration of admissions for rheumatic heart disease was 37 days, for rheumatic fever 46 days, for chorea 54 days, and for subacute bacterial endocarditis 40 days.

The mean duration of admissions was usually longer in children's than in general hospitals, averaging 59 days for all rheumatic conditions as compared with 35 days. The mean duration of admissions for rheumatic heart disease was 60 days in children's as compared with 31 in general hospitals. For rheumatic fever it was 59 days as compared with 40 days. It was about the same for chorea, averaging 53 days in children's hospitals as compared with 54 days in general hospitals.

On this basis, the estimated mean duration of 105 admissions for rheumatic heart disease to children's hospitals was approximately 6,300 days, for 159 admissions for rheumatic fever with or without heart disease 9,400 days, and for 152 admissions for Sydenham's chorea with or without heart disease 8,000 days. Based on this estimate, there were 23,700 patient-days of hospitalization with these conditions in children's hospitals in Philadelphia during 1930-34.

The estimated total duration of 3,005 admissions to general hospitals for uncomplicated rheumatic heart disease was 93,000 patient-days For 1,248 admissions for rheumatic fever with or without heart disease the mean duration is estimated at approximately 50,000 days, for 564 admissions for chorea with or without heart disease at 30,500 days, and for 340 admissions for subacute bacterial endocarditis at 14,000 days. On this basis there were 187,000 days of hospitalization from rheumatic heart disease, rheumatic fever, chorea, and subacute bacterial endocarditis in general hospitals in Philadelphia during the period under study.

Besides the admissions to children's and general hospitals, there were 345 admissions to the Children's Heart Hospital, an institution devoted to the prolonged care of children with rheumatic heart disease, rheumatic fever, and chorea. According to the Philadelphia Heart Association, these admissions totaled 61,309 days during the 5-year period, an average of 178 days duration for each admission. This figure is based on the annual reports of the Philadelphia Heart Association and was furnished through the courtesy of Miss Helen Heikes, executive secretary.

There were altogether 23,700 estimated patient-days from the diseases under study in children's hospitals, 187,000 estimated patient-

days in general hospitals, and approximately 61,300 patient-days in Children's Heart Hospital, an estimated total of 272,000 patient-days in all hospitals from rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis. Excluding the Children's Heart Hospital, which is in a special category, it is estimated that there were 210,700 patient-days of hospitalization in general and children's hospitals during this 5-year period. If from this number is subtracted 5,000 patient-days due to subacute bacterial endocarditis in which the rheumatic background was not evident, there were 205,700 patient-days during the 5-year period in Philadelphia hospitals attributable to rheumatic infection, an average of over 40,000 patient-days annually. If the Children's Heart Hospital is included, the average number of patient-days exceeds 50,000 per year.

PERCENTAGE OF PATIENT-DAYS FOR THESE CONDITIONS

According to Emerson's report (*3*), the average stay in a general hospital in Philadelphia during 1928–29 was 11.1 days. On this basis, 823,381 admissions from all causes to general hospitals in Philadelphia during 1930–34 resulted in approximately 9,140,000 patient-days. The estimated number of patient-days for rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis in general hospitals was 187,000. It is estimated that these conditions accounted for or were important factors in approximately 2 percent of patient-days.

During 1930–34 there were 27,042 admissions to children's hospitals from all causes. According to the Philadelphia Health and Hospital Survey, the mean duration of admissions to children's hospitals in Philadelphia is 11.7 days. There were, on this basis, approximately 316,000 patient-days from all causes during this 5-year period. The total estimated patient-days in children's hospitals with rheumatic heart disease, rheumatic fever, and chorea was 23,700 days, or 7.5 percent of the total patient-days.

For both general and children's hospitals it is estimated that there were 9,446,000 patient-days from all causes and 211,000 patient-days from the conditions under study. On this basis these conditions account for about 2.3 percent of patient-days.

ESTIMATED COST OF HOSPITALIZATION

Based on a cost of $6 per day, the average per diem cost of hospitalization in general hospitals according to Emerson's survey, hospitalization of these conditions in general hospitals cost $1,125,000 during this period. Based on a per diem cost of $5 in children's hospitals, hospitalization for rheumatic conditions in these hospitals cost

$117,500. During the 5-year period the budget of the Children's Heart Hospital amounted to approximately $120,000. Thus the entire cost of rheumatic conditions in general and children's hospitals and the Children's Heart Hospital was $1,362,500 for the 5-year period, or over $272,000 a year. Excluding the Children's Heart Hospital, the cost is over $248,000 a year for the care of patients with these diseases in general and children's hospitals.

The estimate of the costs of hospitalization is exclusive of charges for professional services of physicians. Since 93 percent of admissions were ward patients, professional services were for the most part rendered gratuitously by the physicians of Philadelphia. These estimates do not take into consideration the cost of treatment by private physicians in some instances and to a greater extent in clinics, or the extremely important factor of loss in earning power as a result of disability from these conditions.

CONVALESCENT FACILITIES

The Children's Heart Hospital, an institution sponsored by the Philadelphia Heart Association and financed largely by the United Campaign, the local community fund, is the only institution with facilities devoted strictly to the prolonged care of persons recovering from attacks of rheumatic infection. This sanitarium provides treatment during the interim between hospitalization on the wards of general and children's hospitals for acute rheumatic fever, rheumatic carditis, and chorea and the time when the patient has reached a stage of complete subsidence of the infection.

The facilities of this institution are limited. In normal times it has a capacity of 60 beds. There is no provision for prolonged institutional care of persons over 13 years of age. During most of the period under study it was reduced to 30 beds because of the economic depression, and only girls were admitted. Furthermore, many families cannot afford to pay the modest charge of $3 per week for hospitalization. As a consequence, many of the most destitute families are unable to send their children to this institution. There are, however, a certain number of free beds. Social service departments of general hospitals, church organizations, and other social agencies also provide for a certain number of cases.

Owing to the limitations of age, bed capacity, and the cost of this form of treatment, only a small proportion of patients recovering from attacks of rheumatic fever or chorea receive this treatment. In addition to the Children's Heart Hospital, a few other general convalescent homes occasionally treat persons recovering from rheumatic fever or chorea, or from various clinical manifestations of rheumatic heart disease. Treatment in these institutions is limited almost entirely to children.

Of the 5,921 admissions during the quinquennium under study, only 345, or 5.8 percent, were admitted to the Children's Heart Hospital. Of the 2,389 cases under 20 years of age, the period in which prolonged treatment in special institutions is of the greatest benefit, only 329, or 13.8 percent, were treated in this sanitarium. Of the 345 admissions to the Children's Heart Hospital 40, or 11.6 percent, terminated fatally before the conclusion of the 5-year period. On the other hand, only 40, or 13.6 percent, of the 295 fatal cases of rheumatic heart disease among persons under 20 years of age had been treated at the Children's Heart Hospital.

It is, therefore, evident that this institution furnishes convalescent care for only a small part of the total case load. The percentage of cases treated is so small that it is impossible to evaluate this form of treatment. It is much as though a dam were constructed a third of the distance across a stream. Based on British estimates of at least 6 to 8 beds per 100,000 population (*4*, *5*), and on experience in London (*6*, *7*), at least 200 beds would be required to provide sufficient convalescent facilities for the metropolitan area of Philadelphia. It is doubtful whether this would be sufficient to care for all of the adult cases requiring prolonged periods of rest following cardiac break-downs, or to provide domiciliary care for far-advanced cases of rheumatic heart disease.

SUMMARY

During the 5-year period from January 1, 1930, to December 31, 1934, there were 5,921 admissions involving rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis to 36 hospitals in Philadelphia. Of these admissions, 5,801 were for rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis on a rheumatic basis, while 120 were for subacute bacterial endocarditis in which a definite relationship to rheumatic heart disease was not determined.

Comment is made on difficulties in terminology in describing rheumatic conditions, and on the variety of combinations in which they occur. Considerable improvement in diagnostic standards and in the maintenance of hospital records was noted during the period under study.

The diseases under study were indicated in 0.70 percent of admissions from all causes to Philadelphia hospitals. In 3 children's hospitals they were present in 1.56 percent of all admissions. In 14 teaching hospitals these conditions were noted in 0.79 percent of all admissions. Most of the admissions were to the large general and children's hospitals located in the center of the city.

It is estimated that the conditions under study were present in 2.4 percent of medical admissions to general hospitals and 5.8 percent of medical admissions to children's hospitals.

Rheumatic heart disease, rheumatic fever, and Sydenham's chorea were the principal causes of 87.2 percent of these admissions, while subacute bacterial endocarditis was the principal cause of 5.8 percent of the 5,921 admissions constituting this series. Practically all admissions involving rheumatic fever and chorea were caused primarily by those conditions.

Over 93 percent of admissions involving rheumatic conditions were to the wards of general and children's hospitals. This substantiates the view that rheumatic heart disease is essentially a problem of the class of patients treated on hospital wards.

The total number of admissions to Philadelphia hospitals for rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis, most of which is superimposed on rheumatic heart disease, is probably slightly over 1,200 a year; of these, over 900 are first admissions.

It is estimated that rheumatic conditions and subacute bacterial endocarditis were factors in 272,000 patient-days in Philadelphia hospitals during this 5-year period. Of this number, only about 5,000 patient-days were due to subacute bacterial endocarditis not superimposed on rheumatic heart disease. It is estimated that rheumatic conditions were in varying degrees accountable for 187,000 patient-days in general hospitals and 23,700 patient-days in children's hospitals. They result in over 40,000 patient-days annually in general and children's hospitals. In addition, there were about 61,300 patient-days caused by rheumatic conditions at the Children's Heart Hospital, a sanitarium furnishing prolonged convalescent care. Including this institution, rheumatic conditions account for, or at least are concerned in, over 50,000 patient-days each year in Philadelphia hospitals.

It is estimated that the conditions under study accounted for or were responsible factors in 2.0 percent of patient-days in general and 7.5 percent in children's hospitals.

The estimated cost of hospitalization of patients with these conditions is over $272,000 a year, exclusive of physicians' services, most of which are rendered gratuitously.

Prolonged convalescent care is furnished such a small percentage of patients with rheumatic fever, chorea, and rheumatic heart disease that it is not possible to evaluate its benefit. Only 13.8 percent of patients under 20 years of age were treated at the Children's Heart Hospital. Of the fatal cases under 20 years of age, only 13.6 percent had been admitted to that institution.

REFERENCES

(*1*) Coburn, A. F.: The Factor of Infection in the Rheumatic State. Williams and Wilkins, Baltimore, 1931.

(*2*) Paul, John R.: The epidemiology of rheumatic fever. A preliminary report with special reference to environmental factors in rheumatic heart disease

and recommendations for future investigations. For the American Heart Association, 1930, Metropolitan Life Insurance Co., New York.
(3) Emerson, Haven, et al.: Philadelphia hospital and health survey, 1929. Sponsored by Philadelphia Chamber of Commerce. Published by Welfare Federation of Philadelphia, 1930.
(4) Glover, J. A., et al.: Acute rheumatism in children in its relation to heart disease. Ministry of Health Report on Public Health and Medical Subjects, No. 44. His Majesty's Stationery Office, 1927.
(5) Moon, R. O.: The economic aspects of heart disease. Brit. Med. J., 1:922 (1923).
(6) Thornton, C. E.: The London scheme for the treatment and supervision of juvenile rheumatism. Acta Rheumatologica, 9:10 (May 1937).
(7) Menzies, Sir Frederick: Report of the school medical officer for the year 1937. London County Council, 1937. Vol. III, Part 2.

FACTORS INFLUENCING THE EFFICACY OF PHENOLIZED RABIES VACCINES

I. STRAINS OF FIXED VIRUS [1]

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This series of experiments was designed to investigate the properties of 31 strains of rabies fixed virus, 28 of which are now being used in the manufacture of rabies vaccine in this country and abroad. Such an investigation, especially of the immunizing power of these strains, seemed indicated in view of Webster's report (*1*) that of 33 rabies vaccines purchased on the open market and tested in mice, only 2 showed any immunizing ability. In these experiments we hoped to determine any variations in strains of fixed virus having the same origin, thus demonstrating a varying evolution in different laboratories, and to learn, if possible, the reason for these differences.

Reports in the literature of comparisons of different strains of rabies fixed virus are rather scarce. This is probably due to the widespread use of the Pasteur strain and its derivatives. In India Shortt, Cunningham, and Malone, and their coworkers (*2, 3, 4*), have compared the immunizing potency of their local Kasauli strain with the Pasteur strain in both man and monkeys. They found the Pasteur strain to be slightly superior in producing immunity, and noted that the Kasauli strain was much less resistant to the action of ether. Lepine (*5*) and again Levaditi and Schoen (*6*) have studied the Pasteur strain and several substrains derived from it some years ago. They found that the Pasteur strain itself over a period of years had changed in its resistance to the effect of glycerin and desiccation and that the virulence of the cords of infected animals had decreased. One of the substrains had recovered its ability to infect by the subcutaneous route and produced definite Negri bodies. These authors explain the differences in substrains of the same origin by differences in the technique of their passage and in the type of rabbits used.

[1] From the Division of Biologics Control, National Institute of Health.

There have been other evidences of the possible evolution of fixed virus even after being fixed for many years. Nicolau and Kopciowska (*7*) claim to have reverted the Pasteur fixed strain back to a virus with the characteristics of street virus by repeated brain to peripheral nerve passages, although Levaditi and Schoen (*6*) were unable to repeat this procedure. Proca and Jonnesco (*8*) have caused a lasting prolongation of the incubation period of a fixed virus by passing it through mice partially protected by rabies immune serum. Dodero (*9*) has produced the same effect by allowing fixed virus to remain in glycerin for several months.

Defries and Campbell (*10*) have compared the relative virulence by the intracerebral and intramuscular routes of the original Pasteur strain and one of its substrains carried in this country for over 25 years, and found definite differences.

As to the method of evaluating the properties of any one strain of fixed rabies virus, Remlinger and Bailly (*11*) recommend determining its incubation in the rabbit; response to desiccation, glycerin, dilution (titer), ether and phenol; its pathogenic power by different routes; and finally its immunizing power. These authors point out the evolution of the fixed virus over a long time as proving the necessity for periodic routine evaluation of its properties, and especially is this true in those laboratories making live virus vaccines for human use. And, again, Remlinger (*12*) has suggested the isolation of the most highly immunizing strain of fixed virus and its yearly distribution to all laboratories making rabies vaccine from a central source where the virus could be checked periodically.

The history of each strain of virus tested has been obtained as completely as possible. This was often quite difficult because the strain had passed through as many as four different laboratories from the original isolation of the street virus to its present location over as long a period as 57 years.

The information for each virus is listed in table 1, and it is seen that 25 of the 31 strains had their origin in the original Pasteur strain carried at the Pasteur Institute in Paris. All of these have been through at least 1,000 intracerebral passages and are therefore far removed from the original street virus.

In addition to the substrains from the original Pasteur virus there were four other originally individual strains, one of which has two substrains.

With a few exceptions all have been carried in rabbits and preserved in glycerin between passages while the frequency of intracerebral transfer has varied from every 5 days to 7 months. These figures for the frequency of transfer are average, the time the virus has been carried in the laboratory supplying it being divided by the number of passages made in that laboratory.

TABLE 1.—*History of strains of fixed rabies viruses*

No. of strain	Source	Date isolated as street virus	Number of passages to date	Frequency of recent passage	Animal used for passage	How preserved
1	Pasteur	1882	2,000+	1 month	Rabbit	Glycerin.
2	do	1882	2,000+	1 week	do	Do.
3	do	1882	2,000+	3 weeks	do	Do.
4	do	1882	2,000+	1 week	do	Do.
5	do	1882	2,000+	1 month	do	Do.
6	do	1882	2,000+	7 months	do	Dried.
7	do	1882	2,000+	5 months	do	Glycerin.
8	do	1882	2,000+	2 weeks	do	Do.
9	do	1882	2,000+	2 weeks	do	Do.
10	do	1882	2,000+	2 months	do	Do.
11	do	1882	2,000+	5 days	do	Do.
12	do	1882	2,000+	3 weeks	do	Do.
13	do	1882	2,000+	1 week	Mouse	Do.
14	do	1882	2,000+	2 months	Rabbit	Dried.
15	do	1882	2,000+	6 months	do	Do.
16	do	1882	2,000+	2 months	do	Glycerin.
17	do	1882	1,650	1 week	Mouse	Do.
18	do	1882	2,000+	2 weeks	Rabbit	Do.
19	do	1882	2,000+	2 weeks	do	Do.
20	do	1882	2,000+	3 weeks	do	Do.
21	do	1882	1,000+	6 months?	do	Dried.
22	do	1882	1,000+	5 months	do	Glycerin.
23	do	1882	1,000+	6 months	do	Dried.
24	do	1882	1,000+	4 months	do	Do.
25	do	1882	1,617	2 weeks	do	Do.
26	Budapest	1886	15,000	1 week	do	Glycerin.
27	Texas	1905	300+ (?)	3 weeks	do	Do.
28	do	1905	300+ (?)	2 months	do	Do.
29	do	1905	300+ (?)	2 weeks	do	Do.
30	Rockefeller	?	169	1 week	Mouse	Do.
31	Alabama	1935	62	3 weeks	do	Do.

METHOD OF STUDY OF EACH STRAIN

Incubation period and duration of paralysis.—The original rabbit or mouse brain containing the strain of fixed virus was used either directly or after one or at most two mouse passages.

A 1/10 emulsion was made, centrifuged at 1,000 r. p. m. for 10 minutes and 0.2 cc. of the supernatant injected intracerebrally into a rabbit weighing between 1,500 and 2,000 grams. This rabbit was observed for the time of developing symptoms and allowed to die. The brain was removed and stored in 50 percent glycerin at 0° C. for 1 month; then a portion of the bulb was emulsified and the passage was repeated in a second rabbit.

This rabbit was killed with chloroform on the first day of complete paralysis.

Titer of virus in rabbit brain.—The second rabbit passage brain was emulsified in normal salt solution to a 20 percent emulsion. A portion of this was diluted to a 10 percent emulsion, centrifuged, and serial tenfold dilutions in saline made from the supernatant. Three-hundredths cc. of each dilution was injected intracerebrally into 3 Swiss mice weighing from 15 to 20 grams. The titer was taken to be the highest dilution causing death in at least 2 out of the 3 mice.

Infectivity by intramuscular inoculation.—Five-hundredths cc. of the supernatant from a 1:10 emulsion of the second rabbit passage brain was injected into each masseter muscle in 3 Swiss mice weighing

from 12 to 15 grams. Death of 2 or more mice with typical rabies symptoms was the criterion of ability of the virus to infect when given intramuscularly.

Preparation of phenolized vaccine.—The 20 percent emulsion made from the second rabbit passage brain was filtered through fine gauze into a 250 cc. Erlenmeyer flask with a cotton plug. An equal volume of 2 percent phenol in saline was then added and the flask was placed in the incubator at 37° C. for 24 hours, after which time it was removed and an equal volume of saline added to make a 5 percent emulsion with 0.5 percent phenol. This was placed in the cold room at 5° C. until used.

Resistance to phenol.—Ten cc. of the 10 percent emulsion containing 1 percent phenol made in preparing the phenolized vaccine was placed in a 25 cc. Erlenmeyer flask with a cotton plug and put in the incubator at 37° C. At the end of 24, 48, and 96 hours 0.2 cc. was removed and diluted with an equal amount of saline. Three-hundredths cc. of the resulting 5 percent emulsion was injected intracerebrally into 2 Swiss mice weighing from 12 to 15 grams. Death of both mice with symptoms of rabies was taken to show viability of the virus.

Viability of virus after 2 months' storage.—Two months after the preparation of the phenolized vaccine and its storage at 5° C., 0 03 cc. was injected, undiluted, intracerebrally into 3 mice. Death from rabies of 2 of the 3 mice was necessary to show viability.

Immunizing potency of phenolized vaccine.—After 2 months' storage at 5° C. each vaccine was used to immunize a group of 25 Swiss mice weighing 15 to 20 grams. The vaccine was diluted according to the titer of the rabbit brain used to make the vaccine so that each dose would contain 400 mouse intracerebral M. L. D.'s. This meant that a vaccine whose titer had been 10^{-3} was used undiluted; that having a titer of 10^{-4} was diluted 1:10, and so on. This was done to assure an equal amount of virus in a dose for all strains.

Twenty-five hundredths cc. of the proper dilution (diluted each time used from stock vaccine) was injected every second day, intraperitoneally, for 10 doses.

Thirty days from the start of the immunization the test dose was given. The virus used as the test dose was one of the fixed virus strains being tested but this was the only homologous strain in the study. It had been isolated from a rabid dog in 1935 and carried through 70 passages in mice when first used. Mouse passage brains were emulsified in saline at 1/10 dilution, centrigued at 1,000 r. p. m. for 10 minutes, and serial dilutions made from the supernatant in such a way that they would contain 10, 25, 50, 100, 1,000, and 2,000 M. L. D.'s. This strain of virus used as the test dose was passaged through mice just before each group of vaccines was to be tested.

Three-hundredths cc. of each dilution was injected intracerebrally into 3 to 5 immunized mice. The mice were observed for 30 days and the 50 percent end point was determined by the method of Reed and Muench (*13*).

Control mice obtained at the same time as those immunized received ten-fold dilutions of the test virus intracerebrally to determine what dilution represented 1 M. L. D.

Resistance to glycerin.—The first rabbit passage brain was kept at 0° C. in 50 percent glycerin. Three months after its removal from the rabbit and each month subsequently it was tested for viable virus. A small piece of the bulb was removed, emulsified at 1:10 in saline, centrifuged, and 0.03 cc. of supernatant injected into 2 mice.

Test of identity and specificity of virus strain.—A hyper-immune rabbit serum was produced by 21 daily subcutaneous doses of 2 cc. of a 5 percent rabbit brain emulsion with 0.5 percent phenol prepared from one of the fixed virus strains previously found to be highly immunogenic. This subcutaneous immunization was followed by 3 intraperitoneal doses of 5 cc. of the same vaccine given 1 week apart. Finally, an intraperitoneal dose of 5 cc. of a 5 percent emulsion of live virus was given. The rabbits were bled 10 days following the last dose of virus.

The specificity of this immune serum was first tested by mixing it with equal parts of a 1:500 dilution of rabies street virus (first guinea pig passage), incubating 2 hours at 37° C., then injecting 0.03 cc. of the mixture intracerebrally into 5 Swiss mice (15–20 grams). The same procedure was done simultaneously, using normal rabbit serum.

Four of the mice receiving the street virus emulsion incubated with normal rabbit serum died with typical rabies symptoms and were positive for Negri bodies. All five mice receiving the immune serum street virus mixture survived.

In testing for the specificity of individual fixed virus strains this procedure was repeated. Mouse passage brains for each strain were emulsified, centrifuged, and diluted to 1:5,000. Equal parts of these virus dilutions were mixed with immune serum and normal serum, incubated 2 hours at 37° C., then 4 Swiss mice (15–20 grams) were injected intracerebrally with 0.03 cc. of each mixture. At least 50 percent mortality in the mice receiving the virus-normal serum mixture and no deaths in those injected with the virus-immune serum mixture were the criteria of specificity of the virus strain.

RESULTS

Incubation period and duration of paralysis.—The incubation period varied from the shortest of 4 days to the longest of 13 days. There was agreement with that found in the laboratory from which the strain had been obtained in 24 strains and a difference in 7 strains. Of the 7

strains showing a different incubation period in this laboratory from that in the original, 4 had a longer and 3 a shorter incubation here. One which was longer and one shorter had been carried exclusively in mice in the original laboratory, and our figures represent the incubation in rabbits.

However, in the duration of the paralysis, where the shortest period was 1 day and the longest 7 days, there was not as much agreement. In 10 strains the paralysis lasted the same period as reported in the original laboratory and in 21 strains it differed, being longer in this laboratory in 18 and shorter in 3.

Some idea as to the amount of variation possible in the incubation period with the same strain on different passages is obtained from the

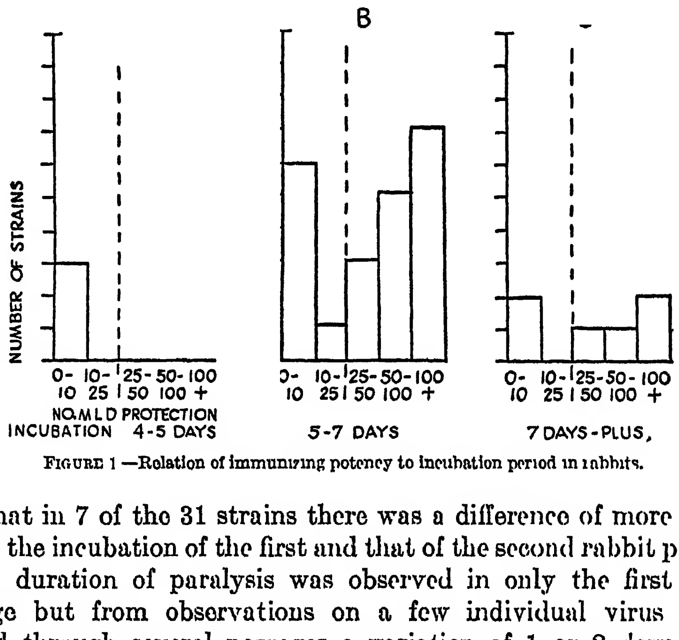

FIGURE 1.—Relation of immunizing potency to incubation period in rabbits.

fact that in 7 of the 31 strains there was a difference of more than 1 day in the incubation of the first and that of the second rabbit passage.

The duration of paralysis was observed in only the first rabbit passage but from observations on a few individual virus strains carried through several passages a variation of 1 or 2 days is not uncommon.

Figure 1 shows that 3 viruses having the short incubation of 4 to 5 days all gave less than 10 M. L. D. protection in the immunity test. Of 22 viruses with an incubation period of 5 to 7 days, 7 gave less and 15 more than 25 M. L. D. protection. Only 6 strains had incubation periods of over 7 days, and of these 4 gave over 25 M. L. D. protection. Therefore it would seem that those viruses whose incubation periods in rabbits fall within the usual 5 to 7 days or longer are more likely to be immunogenic than those having an unusually short incubation.

Ando (*14*), in comparing 2 strains of fixed virus, found that the one having a shorter incubation period in rabbits gave a higher titer

of immune bodies in the serum but he did not compare them as to the immunity produced.

Titer of virus in rabbit passage.—Titers varied from 10^{-3} to 10^{-5}. It was 10^{-3} in 5 strains, 10^{-4} in 20 strains, and 10^{-5} in 6 strains.

These values are lower than those usually reported for fixed virus rabbit passage titers. The reason for this is the fact that saline was used as the diluent instead of 10 percent horse serum or hormone broth, these latter having been shown to keep the virus viable longer in very high dilutions at room temperature (*15*). However, all titers were done in the same manner, and for comparative purposes the procedure used is valid.

In an unpublished experiment we have shown that the degree of immunity produced by a rabies vaccine is directly related to the titer of the virus used. For that reason all vaccinated groups were given the same amount of virus so that the different degrees of immunity produced would not be caused by differences in titer.

Infectivity by intramuscular inoculation.—All but one of the 31 strains were infective by the intramuscular route in spite of the fact that one of the characteristics of fixed rabies virus is supposed to be its relative inability to produce the disease when injected peripherally.

No attempt was made to titer the viruses by intramuscular injection and in the technique here used a relatively large dose (0.1 cc. of 10 percent emulsion supernatant) was given near the central nervous system (masseter muscle) in small mice (12 to 15 grams).

Most of the early experiments in which it was demonstrated that fixed virus given peripherally only rarely was infective were done with rabbits. Several authors more recently have shown fixed virus to be infective intramuscularly in mice even in high dilutions (*1*, *10*).

That the ability to infect mice peripherally, insofar as here tested, has no relation to the amount of immunity produced is obvious since all but one strain did infect by that route. However, the one strain that failed to infect mice when given peripherally gave no immunity.

Fermi (*16*) has stated that a fixed virus which was more virulent by the subcutaneous route gave a greater immunity in experimental animals. However, Ando (*14*) was unable to demonstrate any difference in the immunizing potency of vaccine made from a fixed virus infective subcutaneously as compared to one noninfective by that route.

Resistance to 1 percent phenol.—Different strains resisted 1 percent phenol from less than 24 hours to more than 4 days. Ten strains were not viable, as far as being able to cause rabies in young mice, at the end of 24 hours incubation. Eight strains were viable at 24 hours but not at 48 hours. Six were viable at 48 hours but not at 96 hours. Seven were viable at 96 hours and were not tested beyond that point.

Here again several individual strains were tested for resistance to 1 percent phenol on different rabbit passages and variations were found even with the same strain, sometimes being "killed" in 24 hours in one passage brain and again in 96 hours in another passage. However, the figures quoted in table 2 are those for the rabbit brain emulsions used to make the vaccines for the immunity experiments and are therefore comparable as far as their possible effect on the relative immunizing power of the vaccines

In figure 2 the degree of immunity produced by the vaccines is plotted against the ability of the virus strains to resist 1 percent phenol. Of 10 viruses killed in less than 24 hours, 7 gave less and 3 more than 25 M. L. D. protection. Eight strains resisting phenol for 24 hours had 3 with less and 5 with more than 25 M. L. D. protection. Four gave immunity against more than 25 M. L. D. and 2

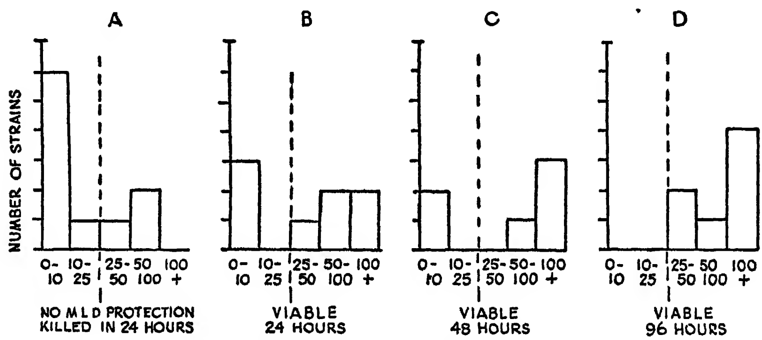

FIGURE 2.—Relation of immunizing potency to resistance to phenol

less in the group resisting phenol for 48 hours. All 7 viruses resisting phenol for 96 hours gave over 25 M. L. D. protection.

Apparently the ability to resist the lethal effect of phenol adds to the immunogenic value of the virus in the form of phenolized vaccine.

Viability of virus after 2 months' storage.—In none of the 31 strains was there sufficient viable virus to cause rabies when given intracerebrally in young mice after it had been stored at 5° C. for 2 months.

It is interesting to note that 21 of the phenolized vaccines at the time of their removal from the incubator and before being stored in the cold room did show viable virus. The 0.5 percent phenol in the prepared vaccine even at 5° C. apparently continues to destroy any viable virus left after incubation.

Immunizing potency of phenolized vaccine.—Slight or no immunity (0–25 M. L. D. protection) was given by 12 viruses, moderate immunity (25–100 M. L. D. protection) by 10 viruses, and a high degree of immunity (100+ M. L. D. protection) by 9. The highest immunity produced was against at least 2,000 M. L. D.

Resistance to glycerin.—Four virus strains were not viable after 3 months' storage in 50 percent glycerin at 0° C. Four strains were viable up to 6 months, and 23 strains were viable for 6 months or longer.

As seen in figure 3 there was apparently no direct relationship between the ability of the virus to resist the effect of glycerin and its immunizing power in the form of phenolized vaccine.

Specificity of virus.—All strains were shown to be rabies virus in the tests for specificity using known rabies immune serum.

Relation of immunizing power to frequency of passage transfer.—In figure 4 the strains of viruses have been divided into those transferred

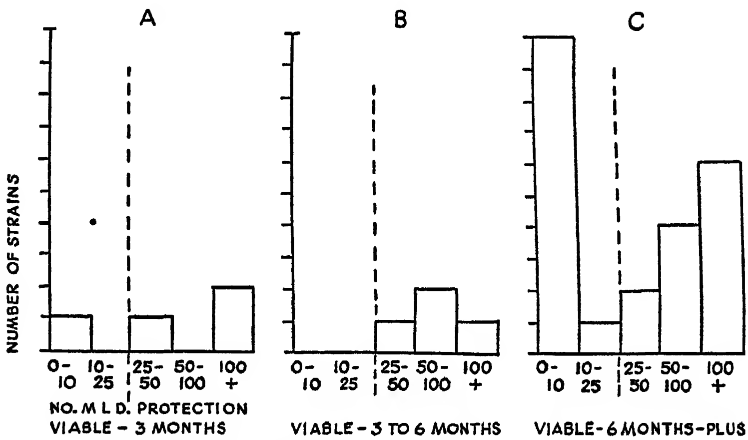

FIGURE 3 —Relation of immunizing potency to resistance to glycerin.

every 2 weeks or less, those every 2 to 4 weeks, and those every 4 weeks or longer. Of 13 strains in the 2-week group, 8 gave more than and 5 less than 25 M. L. D. protection with the vaccines. In the 2 to 4-week groups there were 4 with more and 4 with less than 25 M. L. D. immunity. Only 4 viruses were transferred every 4 weeks or longer, and 3 of these protected against more than 25 M. L. D.

Six virus strains have been omitted from this table because they have been carried in the dried state *in vacuo* between transfers and therefore are not comparable.

Although not clear-cut there does appear to be some trend toward greater immunizing power in those transferred more frequently. The virus strain giving the greatest degree of immunity was transferred the most frequently (every 5 days).

Relation of immunizing power to degree of removal from original street virus.—That the number of passages removed from the original street virus has no relation to the immunizing value of the virus strain is obvious from the variable results with the large group of

substrains having the Pasteur virus as their source. Yet it is interesting to note that of 5 substrains derived from street virus more recently than the Pasteur strain, 3 gave immunity to over 100 M. L. D. Ando (*14*) has reported that a higher degree of immunity is obtained in animals with vaccine made from a more recently fixed virus than from one fixed for a long period of time.

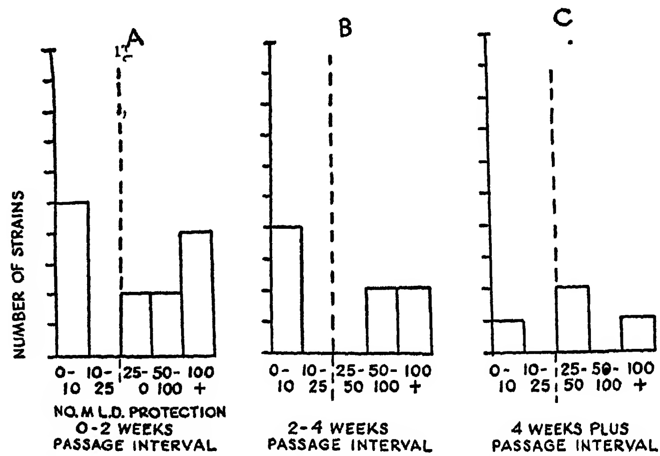

FIGURE 4.—Relation of immunizing potency to frequency of passage transfer.

TABLE 2.—*Properties of strains of fixed rabies viruses*

No. of strain	Incubation period (days)		Duration of paralysis (days)		Resistance to phenol (days)	Resistance to glycerin (months)	Peripheral infectivity	Specificity	Titer	Viability (vaccine) 2 months 5° C.	Immunity 50 percent end point number M. L. D.
	Source	NIH	Source	NIH							
1	5-6	5-6	2-3	1	0	10+	+	+	10^{-4}	−	10−
2	6-7	5-7	1-2	1	2	6	+	+	10^{-5}	−	10−
3	6-7	5-6	1	3	0	6	+	+	10^{-5}	−	1
4	5-6	5	1-2	4	1	4	+	+	10^{-3}	−	200
5	5-6	6	1-2	4	1	7+	+	+	10^{-4}	−	5
6	5-6	5-6	1-2	6	4+	8+	+	+	10^{-4}	−	100
7	5	7-8	(?)	3	4+	10+	+	+	10^{-4}	−	140
8	5	4-5	2	1	1	7	+	+	10^{-5}	−	2
9	5-6	6	1−	4	0	8+	+	+	10^{-3}	−	82
10	5	5	2	2	0	7	+	+	10^{-4}	−	4+
11	6	5	1-2	7	4+	6	+	+	10^{-4}	−	2,000+
12	6	4-5	1-2	5	0	7	+	+	10^{-3}	−	0
13	6-8	4-9	2-4	3-5	0	6+	−	+	10^{-3}	−	0
14	5	4-6	1	1	0	7	+	+	10^{-4}	−	84
15	5-6	5-6	1	2	2	3	+	+	10^{-4}	−	100+
16	7	6-8	2+	4	1	8	+	+	10^{-4}	−	28
17	7-8	6-9	2-4	5	1	7	+	+	10^{-4}	−	100+
18	5-6	5	1-2	3	4+	7	+	+	10^{-5}	−	37
19	4-5	5-6	2-4	2	4+	10+	+	+	10^{-4}	−	30
20	4-5	5	1	8	1	9	+	+	10^{-5}	−	100
21	5	5-6	1−	6	4+	9+	+	+	10^{-4}	−	225
22	4	5-6	3-4	3	2	4	+	+	10^{-4}	−	55
23	5-6	4-6	1-2	3	0	8+	+	+	10^{-4}	−	16
24	5-6	7	1-2	4	1	7+	+	+	10^{-4}	−	3
25	7-8	6-8	2	6	1	5	+	+	10^{-4}	−	100
26	4	4-5	3-4	5	2	2	+	+	10^{-4}	−	5−
27	5	5	2-3	2	2	2	+	+	10^{-3}	−	500
28	5-6	5-6	1-2	6	0	5	+	+	10^{-5}	−	27
29	4-5	5	1−	5	4+	8	+	+	10^{-4}	−	175
30	5	12-13	2-4	1	0	6	+	+	10^{-4}	−	1
31	8	6-7	(?)	4	2	7	+	+	10^{-4}	−	100+

Comparison of substrains of common origin.—As can be seen in table 2, in which the substrains Nos. 1 to 25 are all derivatives of the Pasteur strain, there are wide variations in every property tested, showing the evolution of this one virus strain as it has been carried under different conditions over a long period of time.

Virus No. 13, for instance, was derived from No. 12 one year ago, while No. 12 came from No. 11 about 5 years before that. It is interesting that No. 11 now gives the highest degree of immunity (2,000+ M. L. D. protection) whereas Nos. 12 and 13 give no protection whatsoever. During the 6 years since removal from No. 11, virus No. 12 had been carried through 146 passages. However, 50 passages within the 1 year since removal from No. 12 have failed to change No. 13 in any of its characteristics except that it no longer infects mice when given peripherally.

DISCUSSION

That any one strain of fixed rabies virus can change in its biologic properties even though carried in a uniform manner in one laboratory is sufficient reason to recommend a routine checking of the virus periodically. Such a check for those laboratories producing killed virus vaccines should include:

(1) Specificity of virus: By means of a virus neutralization test with known rabies immune serum.

(2) Resistance to chemical: Samples of vaccine removed at intervals during preparation and tested for viable virus by intracerebral inoculation into young mice.

(3) Virulence of rabbit brains: Titer brain emulsion by injecting serial ten-fold dilutions of centrifuged brain emulsion intracerebrally in young mice.

(4) Immunizing potency: Immunize mice with the final vaccine product, then test with the known rabies virus (*17*).

In those laboratories using live virus vaccines, it is further recommended that the evaluation of their fixed virus strains also include:

(5) Infectivity subcutaneously: Inject mice subcutaneously with serial ten-fold dilutions of virus emulsion to determine if virus is infective when given by that route and, if so, what dilution represents the M. L. D.

(6) Resistance to desiccation (where Pasteur type vaccine is being prepared): Samples of cords dried a varying number of days, emulsified, and injected intracerebrally in young mice to detect the point at which the virus is no longer viable.

The experiments here reported show that as far as phenolized vaccines are concerned (15 of the strains are now used to manufacture phenolized vaccines) the various strains of rabies fixed virus differ markedly in their immunizing potency even though derived from the

same parent strain. The need of establishing a strain of high immunogenic value for use in manufacturing rabies vaccines for human or animal use is obvious. There need be no excuse for marketing vaccines known to have poor or even no immunizing power. However, suppose we were to determine the strain that is the most immunizing and supply it to all laboratories making rabies vaccine. We would have no assurance that 5 years, or even 1 year later those substrains would all still be highly immunogenic. In other words, owing to the manner in which the virus might be handled in different laboratories, the evolution of the strain might very well be toward less and less immunizing potency.

Therefore, a very important part of the problem is the determination of how to build up and maintain the immunizing value of a fixed rabies virus strain. Work directed toward answering this question is now in progress and will be published at a later date.

From the analyses made of the results in this investigation of 31 strains (figs. 1 to 4) immunizing potency is apparently not related to the degree of removal from street virus, the resistance to glycerin, or the animal in which carried. It does seem to be related, as would be expected, to its ability to resist the killing effect of phenol and perhaps to the rapidity with which it is passaged.

There is also evidence that those strains having the usual incubation periods of 5 to 7 days, or longer, are more likely to be immunogenic than those with shorter incubations.

SUMMARY

Marked variations were found in the properties of 25 substrains derived from the original Pasteur strain.

Immunizing power of strains seemed related to their ability to resist phenol, to the rapidity of their passage transfer, and possibly to the length of the incubation period in rabbits.

High immunizing potency is not an inherent characteristic of any particular strain but apparently can be increased or decreased during its passage transfers over a long period of time.

Laboratories manufacturing rabies vaccine should investigate the properties of their rabies fixed virus strain periodically.

REFERENCES

(*1*) Webster, L. T.: A mouse test for measuring the immunizing potency of antirabies vaccines. J. Exp. Med., 70: 87 (1939).

(*2*) Cunningham, J., and Malone, R. H.: Comparison of antirabies immunity produced by different vaccines. Ind. Med. Res. Mem. No. 15 (1930).

(*3*) Cunningham, J., Malone, R. H., and Craighead, A. C.: Comparison of antirabies immunity with different vaccines. Ind. Med. Res. Mem. No. 26 (1933).

(*4*) Shortt, H. E., Malone, R. H., Craighead, A. C., and McGuire, J. P.: Comparison of antirabies immunity with different vaccines. Ind. Med. Res. Mem. No. 28 (1934).

(5) Lepine, P.: Evolution of fixed strains. J. Hyg., **38:** 180 (1938).
(6) Levaditi, C., and Schoen, R.: The potential Negrigenesis of fixed rabies virus. C. R. Soc. de Biol, **119:** 811 (1935).
(7) Nicolau, S., and Kopciowska, L.: Attempt to transform fixed rabies virus to street virus. Ann. Inst. Past., supp., pp. 108–126 (1935.)
(8) Proca, G., and Jonnesco, D.: Lasting attenuation of two strains by passage through mice. C. R. Soc. de Biol., **120:** 1274 (1935).
(9) Dodero, J.: Reactivation of fixed virus by glycerin. C. R. Soc. de Biol., **128:** 150 (1938).
(10) Defries, R. D., and Campbell, T. C.: Relative pathogenicity of two strains of fixed rabies virus for white mice and rabbits. Canad. Pub. Health J, **26:** 615 (1935).
(11) Remlinger, P., and Bailly, J.: Methods of expert evaluation of rabies fixed virus. Bull. Inst. Past., **33:** 609 (1935).
(12) Remlinger, P.: Possibility of standardizing antirabies treatment. Rev. d'Hyg., **50:** 186 (1928).
(13) Reed, L. J., and Muench, H.: A simple method of estimating fifty percent end points. Am. J. Hyg., **27:** 493 (1938).
(14) Ando, K: Comparative study of immunity with various strains of fixed rabies virus. Jap. J. Exp. Med., **13:** 149 (1935).
(15) Milan, D. F.: Effect of various diluents acting for short periods on rabies virus in high dilutions. Am. J. Trop. Med., **19:** 297 (1939).
(16) Fermi, C.: Effect of virulence of fixed virus on its immunizing and antigenic action. Ztschr. f. Immunitatsforsch. u. exp. Therap., **59:** 276 (1928).
(17) Habel, K.: Evaluation of a mouse test for the standardization of the immunizing power of antirabies vaccines. Pub. Health Rep, **55:** 1473 (1940).

CARE OF THE FEET *

General Statement.

No part of the human body is more apt to be overworked and neglected than the feet, yet their care is of prime importance to our health as well as to our comfort. It is estimated that 90 percent of all people in the United States suffer from some kind of foot trouble. Over 80 percent of the individuals who failed to qualify for military service in the first World War were rejected because of defects of the feet. These findings stimulated research which will be of great public benefit, for as a result it has been shown that many foot disorders can be avoided through the practice of simple and effective protective measures. Shoes show the good effects of improved design, and the public is now buying shoes for fit as well as for looks.

Cause of Foot Disorders.

Many defects of the feet are the result of improper care during infancy. The wearing of poorly fitting shoes and hose is rightfully blamed for much foot trouble. Tight shoes cause pressure and shoes that are too large cause friction. Together these conditions are responsible for a large proportion of the corns, bunions, and ingrown toenails which plague those who wear shoes. The heels of shoes should be watched for one-sided wear and kept straight to avoid running the shoes over.

* This material is available in leaflet form and may be obtained by addressing the Surgeon General, U. S Public Health Service, Washington, D C

During Infancy and Childhood.

All congenital deformities should be attended to as early in the child's life as possible. The orthopedic surgeon may be able to correct many of these cases without a cutting operation.

The use of devices to encourage a child to walk early is not recommended. During the period when the tiny bones are forming and the muscles are gaining strength it is not advisable to force the child to walk before it is ready to do so.

From the time the child first starts to bear weight on his feet, shoes should be well fitted and well supported through the arch of the foot, particularly for children whose feet tend to flatten when they stand up.

During School Life.

Results of school examinations have demonstrated that 80 percent of the girls and 65 percent of the boys have definite signs of foot troubles. The importance of the size of stockings is not sufficiently recognized. During the period of rapid growth the foot should be measured frequently to insure the wearing of stockings of proper foot length. "Gym" shoes should be worn only during the gymnasium period and not through the entire day, for a flat-soled shoe of this type does not supply adequate support for the feet, particularly the arches.

The growing child should be taught the importance of foot cleanliness and how to protect the feet against ill effects of what may seem to him to be minor injuries.

During Adult Life.

As age advances, the bones and cartilage of the feet become harder and more brittle and defects are far more difficult to correct. Foot trouble may be a part of a general bodily condition where attention should be directed toward the improvement of the general health.

The footwear of the expectant mother should receive special attention, for the increased weight of child-bearing imposes a greater strain on the feet. Pressure within the abdomen interferes with the free circulation of blood in the legs and feet, with the result that they may swell sufficiently to change the fit of both hose and shoes.

Standing and Walking.

Faulty use of the feet in standing and walking is responsible for much foot trouble.

Standing.—When standing for long periods, place the feet 2 to 4 inches apart, point them straight ahead and support the weight on the outside of the feet. To avoid forming the habit of standing on relaxed feet one should, from time to time, deliberately exercise the muscles of the arch by drawing up and relaxing the toes.

In stepping forward the weight should fall first on the heel, whereupon the body is carried forward over the foot, weight being applied along the outside of the foot from the heel to the small toe and finally across the forward part of the foot to the great toe. The ideal position of the foot in walking is pointed straight ahead or with the toes pointed slightly toward the midline. Jarring the body incident to vigorous walking may be relieved by wearing rubber heels.

The Toenails.

The toenails should be cut straight across and not too short. Avoid rounding the nails at the corners where pressure from the shoe may cause improperly cut nails to grow into the flesh, with painful and disabling results.

Excessive Perspiration.

Excessive sweating of the skin of the feet is often a source of annoyance to the individual and those about him. Frequent cleansing and careful drying of the feet, together with frequent changes to dry hose and shoes may aid in relieving this condition.

Infection of Feet.

Prompt care of all wounds and blisters on the feet may prevent serious consequences. Since the feet, covered by hose and shoes, afford conditions favorable to the growth of germs (warmth, dampness, and darkness), a serious foot infection may develop rapidly from a small beginning.

Fallen Arches (Flat Feet).

Fallen arches are the result of weakened leg muscles which allow the main or lengthwise arch in the foot to sag. An orthopedic surgeon should be consulted about this condition, as special treatment frequently is indicated. The wearing of a "stock" arch supporter is not to be recommended as a routine procedure.

Hygiene of Feet.

1. The feet should be bathed at least once a day with soap and warm water and then thoroughly dried.

2. Attention should be given to the proper fitting of hose and shoes.

3. Practice a method of standing and walking which is mechanically correct. When sitting it is a good habit to cross the feet at the ankles (not the legs at the knees) for relaxation.

4. Exercise the feet. The arches may be strengthened by bending the toes, best accomplished by picking up small objects, such as marbles, with the toes.

COURT DECISION ON PUBLIC HEALTH

Compensation under workmen's compensation act for death from typhoid fever denied.—(Pennsylvania Superior Court; *Loudon* v. *H. W. Shaull & Sons et al.*, 13 A.2d 129; decided April 29, 1940.) A laborer on highway work died from typhoid fever and his widow sought compensation under the Pennsylvania Workmen's Compensation Act. The decedent became ill on or about August 21, 1936, his illness was diagnosed as typhoid fever on August 28, and death occurred on September 14. It was conceded by the employer and the insurance carrier, for the purposes of the case, that the decedent's death was definitely traceable to the drinking of contaminated water while at work, some time during the month of August, but in opposing an award they asserted that there was no evidence showing the exact date of the absorption of the germ or of other facts that constituted an "accident" within the meaning of the workmen's compensation statute. On the basis that the deceased became ill on August 21 and that there was medical testimony indicating that the average incubation period for typhoid fever was from 10 to 14 days, the compensation authorities had found that the accident occurred on or about August 11.

The holding of the superior court was that the award made to the claimant could not stand. Pointing out that an accident was a "sudden and unexpected event," the court said that a sudden event implied a distinct happening or occurrence at a particular time and that "When this alleged accident happened no one could state and no attempt was made to do so." After briefly reviewing the medical testimony given as to the incubation period for typhoid fever, the court stated that, under that testimony, the time of the alleged accident could not be definitely fixed and that, while the exact moment an accident occurred need not be determined, the date should be definitely stated with reasonable certainty. "To fix a time when the germ entered decedent's body, which is the accident alleged, would be a mere surmise."

DEATHS DURING WEEK ENDED AUGUST 24, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug 24, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,063	6,895
Average for 3 prior years	7,064	
Total deaths, first 34 weeks of year	292,735	287,111
Deaths under 1 year of age	476	451
Average for 3 prior years	509	
Deaths under 1 year of age, first 34 weeks of year	17,105	17,204
Data from industrial insurance companies:		
Policies in force	64,973,192	66,791,913
Number of death claims	10,907	10,328
Death claims per 1,000 policies in force, annual rate	8.8	8.1
Death claims per 1,000 policies, first 34 weeks of year, annual rate	10.0	10.4

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 31, 1940

Summary

Reports from the State health officers show a slight decline in poliomyelitis for the current week, with 606 cases reported as compared with 623 for the preceding week and with a 5-year (1935–39) median of 479.

The highest incidence of poliomyelitis is still being recorded for the East North Central and West North Central groups of States, which reported 405, or 67 percent, of the current weekly total while comprising only about 30 percent of the total population. Decreased incidence is shown in 5 of the geographic areas, while slight increases occurred in 4. The largest numbers of cases were reported from Michigan (135), Indiana (68), Iowa (56), Kansas (43), and West Virginia (41).

Of the 9 important communicable diseases included in the following table, only influenza, measles, and poliomyelitis were above the 5-year median expectancy, and only diphtheria and smallpox were higher than during the preceding week.

Of 379 cases of typhoid fever (5-year median, 614) 255 cases were reported in the South Atlantic and South Central States, with 40 cases in Texas, 33 in Arkansas, 29 in North Carolina, 24 in Louisiana, and 23 in Georgia.

Ten cases of Rocky Mountain spotted fever were reported for the current week, all in midwestern and eastern States, and 53 cases of endemic typhus, all but 1 (in California) of which were in the South Atlantic and South Central States.

For the current week the Bureau of the Census reports 7,274 deaths in 88 major cities of the United States, as compared with 7,063 for the preceding week and with a 3-year (1937–39) average of 7,204 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended August 31, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Aug. 31, 1940	Sept. 2, 1939		Aug. 31, 1940	Sept. 2, 1939		Aug. 31, 1940	Sept. 2, 1939		Aug. 31, 1940	Sept. 2, 1939	
NEW ENG.												
Maine	0	4	1	------	------	------	3	1	9	0	0	0
New Hampshire	0	0	0	------	------	------	0	0	0	0	0	0
Vermont	0	0	0	------	------	------	2	3	0	0	0	0
Massachusetts	1	3	3	------	------	------	52	30	21	0	0	0
Rhode Island	0	0	0	------	------	------	2	13	2	0	0	0
Connecticut	0	0	1	1	------	------	6	11	4	0	0	0
MID. ATL.												
New York	5	8	11	[1]6	[1]1	[1]1	128	54	75	1	1	8
New Jersey	1	0	2	------	------	1	27	5	14	1	0	1
Pennsylvania	4	11	16	------	------	------	39	40	83	1	2	4
E. NO. CEN.												
Ohio	1	13	13	1	4	4	8	14	14	0	2	1
Indiana	5	12	5	4	2	4	1	7	3	1	0	1
Illinois	5	10	15	6	6	6	22	8	11	2	0	2
Michigan [2]	1	6	6	------	3	2	55	0	27	1	1	0
Wisconsin	1	0	2	20	10	12	79	22	33	0	1	1
W. NO. CEN.												
Minnesota	2	10	2	2	1	1	1	26	6	0	0	0
Iowa [3]	17	2	5	------	------	1	15	17	2	2	0	1
Missouri [3]	1	7	8	------	------	14	2	1	2	2	0	1
North Dakota	4	2	2	1	------	------	0	2	2	0	1	0
South Dakota	0	0	0	------	4	------	0	5	0	1	0	0
Nebraska	0	0	1	------	------	------	3	0	2	0	1	0
Kansas	2	9	2	6	------	------	12	2	2	0	0	0
SO. ATL.												
Delaware [3]	0	0	0	------	------	------	2	0	0	0	0	0
Maryland [2] [3]	1	1	3	2	------	1	3	4	6	1	0	1
Dist. of Col.	2	1	2	------	1	------	3	2	2	0	1	1
Virginia [3] [4]	15	16	23	38	12	------	10	7	7	1	0	2
West Virginia [3]	2	5	11	7	3	16	1	3	3	0	1	1
North Carolina [3] [4]	4	61	44	------	------	1	2	19	19	0	1	2
South Carolina	4	6	6	90	115	53	10	3	3	1	0	0
Georgia [3] [4]	7	45	16	25	15	------	4	6	0	0	0	0
Florida [4]	8	3	6	3	4	------	0	4	1	0	0	0
E. SO. CEN.												
Kentucky	9	10	10	2	------	3	23	2	9	0	1	2
Tennessee [3]	4	6	0	4	7	7	7	0	2	1	0	0
Alabama [4]	9	12	21	3	6	6	27	1	3	3	0	1
Mississippi [2] [4]	12	17	17	------	------	------	------	------	------	0	1	0
W. SO. CEN.												
Arkansas	6	22	14	3	12	4	4	3	3	0	0	0
Louisiana [4]	5	7	7	1	5	7	0	1	0	1	0	1
Oklahoma	5	7	7	5	4	8	1	3	3	0	0	0
Texas [4]	22	25	31	108	83	33	29	27	18	3	0	0
MOUNTAIN												
Montana	5	0	1	------	------	------	9	11	7	0	0	0
Idaho	0	0	0	------	------	------	0	0	0	0	0	0
Wyoming	0	0	0	------	1	------	0	8	4	0	0	0
Colorado	4	13	9	------	5	------	14	3	8	0	0	0
New Mexico	5	1	2	------	1	------	6	0	1	1	0	0
Arizona	0	0	0	30	7	7	7	1	1	0	1	0
Utah [3]	0	0	0	------	------	------	9	4	4	0	0	0
PACIFIC												
Washington	0	1	0	------	------	------	3	23	5	0	0	1
Oregon	1	2	2	5	1	4	9	10	5	0	0	0
California [4]	10	19	19	10	11	11	26	53	53	0	0	1
Total	185	377	377	383	274	310	666	465	633	24	15	42
35 weeks	9,231	12,687	15,410	169,989	152,280	142,093	230,037	349,371	340,371	1,160	1,423	4,292

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 31, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1935–39	Week ended		Median 1935–39	Week ended		Median 1935–39	Week ended		Median 1935–39
	Aug. 31, 1940	Sept. 2, 1939		Aug. 31, 1940	Sept. 2, 1939		Aug. 31 1940	Sept. 2, 1939		Aug. 31, 1940	Sept. 2, 1939	
NEW ENG.												
Maine	1	0	1	0	1	4	0	0	0	3	4	3
New Hampshire	0	0	0	2	1	0	0	0	0	0	0	0
Vermont	0	2	0	0	1	1	0	0	0	0	1	0
Massachusetts	2	3	3	10	18	26	0	0	0	7	4	4
Rhode Island	1	0	0	2	0	1	0	0	0	0	0	0
Connecticut	0	1	2	7	3	4	0	0	0	7	4	3
MID. ATL.												
New York	20	100	52	38	46	72	0	0	10	12	11	28
New Jersey	4	10	10	19	16	13	0	0	0	4	6	6
Pennsylvania	13	44	13	42	57	65	0	0	0	10	16	24
E. NO. CENT.												
Ohio	21	11	14	17	46	46	0	2	0	6	10	29
Indiana	68	2	2	23	33	29	0	0	0	6	14	16
Illinois	20	9	19	70	57	77	1	1	1	16	259	25
Michigan [2]	135	109	34	41	75	62	3	0	0	4	9	14
Wisconsin	19	7	7	30	66	55	0	0	0	1	0	1
W. NO. CEN.												
Minnesota	6	60	5	15	13	18	3	3	2	1	2	2
Iowa [3]	56	2	2	13	21	17	0	2	2	0	3	4
Missouri [3]	18	0	0	6	14	19	1	0	1	8	9	25
North Dakota	1	1	1	3	6	4	0	0	0	2	1	1
South Dakota	5	1	0	1	9	6	3	1	1	0	0	1
Nebraska	13	2	0	2	3	4	0	1	1	2	1	0
Kansas	43	3	2	19	27	23	0	0	1	7	4	11
SO. ATL.												
Delaware [3]	0	0	0	0	1	1	0	0	0	1	1	1
Maryland [2 3]	1	1	1	5	12	11	0	0	0	6	5	10
Dist. of Col	0	1	1	4	2	2	0	0	0	4	2	5
Virginia [3 4]	7	0	3	1	5	10	0	0	0	5	13	19
West Virginia [3]	41	2	2	11	10	16	0	0	0	6	12	17
North Carolina [3 4]	1	8	8	23	30	24	0	0	0	29	20	19
South Carolina	1	6	1	8	3	3	0	0	0	8	6	18
Georgia [3 4]	3	2	2	3	13	10	0	0	0	23	18	18
Florida [4]	3	7	2	2	2	2	0	0	0	3	1	2
E. SO. CEN.												
Kentucky	10	3	7	17	29	29	0	1	0	16	33	34
Tennessee [3]	4	3	2	10	10	10	0	0	0	15	9	13
Alabama [4]	4	1	4	20	17	13	0	0	0	14	6	16
Mississippi [2 4]	0	0	2	4	11	8	0	0	0	13	9	9
W. SO. CEN.												
Arkansas	1	2	0	4	9	8	0	2	0	33	19	13
Louisiana [4]	7	0	0	6	1	7	0	0	0	24	20	10
Oklahoma	3	2	0	8	9	7	1	0	0	15	13	16
Texas [4]	8	8	8	16	31	24	0	0	0	40	60	59
MOUNTAIN												
Montana	16	0	0	13	9	8	0	0	0	2	2	2
Idaho	1	1	0	3	0	1	0	0	0	0	2	2
Wyoming	4	0	0	1	3	4	3	0	0	1	1	1
Colorado	3	1	1	7	4	7	0	1	0	5	3	4
New Mexico	2	2	0	0	1	2	0	0	0	4	7	10
Arizona	1	8	1	1	1	1	0	1	0	0	2	3
Utah [2]	3	1	0	2	5	10	0	0	0	1	2	2
PACIFIC												
Washington	20	1	1	9	8	9	0	0	3	7	8	3
Oregon	3	2	1	4	6	16	2	1	1	1	3	8
California [4]	13	50	24	39	54	54	0	0	1	7	12	12
Total	606	479	479	581	799	844	17	16	27	379	642	614
35 weeks	3,288	3,018	3,018	120,056	117,978	166,580	1,988	8,707	8,080	5,784	8,226	9,268

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended August 31, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended Aug. 31, 1940	Whooping cough, Week ended Sept. 2, 1939
NEW ENG.		
Maine	23	15
New Hampshire	0	0
Vermont	3	51
Massachusetts	72	112
Rhode Island	1	39
Connecticut	20	66
MID. ATL.		
New York	216	264
New Jersey	74	96
Pennsylvania	309	438
E. NO. CEN.		
Ohio	144	209
Indiana	19	44
Illinois	94	220
Michigan [2]	200	191
Wisconsin	59	121
W. NO. CEN.		
Minnesota	8	17
Iowa [3]	23	19
Missouri [3]	8	20
North Dakota	7	34
South Dakota	0	14
Nebraska	8	2
Kansas	41	17
SO. ATL.		
Delaware [3]	4	6
Maryland [2,3]	76	39
Dist. of Col.	9	29
Virginia [3,4]	22	18
West Virginia [2]	43	5
SO. ATL.—continued		
North Carolina [3,4]	93	110
South Carolina	18	6
Georgia [3,4]	12	17
Florida [4]	0	7
E. SO. CEN.		
Kentucky	27	24
Tennessee [3]	25	22
Alabama [4]	21	18
Mississippi [2,4]	------	------
W. SO. CEN.		
Arkansas	5	16
Louisiana [4]	0	23
Oklahoma	8	2
Texas [4]	142	40
MOUNTAIN		
Montana	6	11
Idaho	0	1
Wyoming	2	3
Colorado	0	9
New Mexico	7	10
Arizona	14	1
Utah [2]	36	30
PACIFIC		
Washington	23	12
Oregon	14	7
California [4]	215	67
Total	2,107	2,531
35 weeks	112,304	131,769

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended Aug. 31, 1940, 10 cases as follows: Iowa, 1; Missouri, 1; Delaware, 1; Maryland, 2; Virginia, 2; North Carolina, 1; Georgia, 1; Tennessee, 1.
[4] Typhus fever, week ended Aug. 31, 1940, 53 cases as follows: Virginia, 1; North Carolina, 4; Georgia, 15; Florida, 3; Alabama, 12; Mississippi, 2; Louisiana, 5; Texas, 10; California, 1.

PLAGUE INFECTION IN GROUND SQUIRRELS AND FLEAS IN CALIFORNIA AND WYOMING

IN GROUND SQUIRRELS AND FLEAS IN SAN BERNARDINO COUNTY, CALIF.

Under date of July 30, 1940, Dr. Bertram P. Brown, Director of Public Health of California, reported plague infection proved in organs from 4 ground squirrels (*C. fisheri*) submitted to the laboratory on July 9 from a ranch approximately 12 miles northwest of Big Bear Lake, and under date of August 20, in a pool of 91 fleas from 44 golden-mantled squirrels submitted to the laboratory on July 26 from Fawnskin Valley, 1 mile north of Fawnskin Resort, San Bernardino County, Calif.

IN GROUND SQUIRREL AND FLEAS IN SUBLETTE COUNTY, WYO.

Under date of August 21, 1940, Surgeon L. B. Byington reported plague infection proved in a pool of 54 fleas from 22 ground squirrels, in tissue from 1 ground squirrel, all from a locality 8 to 10 miles north of Kendal Ranger Station, Sublette County, Wyo., and in a pool of 18 fleas from 14 ground squirrels taken from 12 to 15 miles north of the same station. The ground squirrels, all of the same species, *C. armatus*, were all shot the same day, August 6, 1940.

VENEREAL DISEASES

New Cases Reported for June 1940 [1]

Reports from States

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis [2]					
	Primary and secondary	Early latent [3]	Rate per 10,000 population	Includes late latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Alabama	224	265	1.67	253	0.86	63	0.22	1,323	4.52	479	1.64	4	0.01
Alaska [4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Arizona	18	22	.96	79	1.89	8	.19	177	4.23	131	3.13	1	.02
Arkansas	213	250	2.26	347	1.67	29	.14	984	4.74	156	.75	14	.07
California	[5] 351	-----	.56	1,132	1.81	74	.12	1,682	2.69	1,418	2.27	15	.02
Colorado	78	-----	.72	119	1.10	19	.18	216	2.01	63	.58	-----	-----
Connecticut	16	10	.15	77	.44	4	.02	130	.74	101	.58	1	.01
Delaware	13	13	.99	14	.53	7	.27	135	5.13	33	1.25	2	.08
Dist. of Col.	-----	-----	-----	-----	-----	-----	-----	574	9.03	291	4.58	5	.08
Florida	215	497	4.19	974	5.73	63	.37	1,819	10.71	203	1.19	13	.08
Georgia	-----	1,238	3.98	644	2.07	-----	-----	1,882	6.05	72	.23	8	.03
Hawaii	4	2	.15	19	.47	8	.20	53	1.31	78	1.93	-----	-----
Idaho	15	-----	.30	[6] 16	.32	1	.02	35	.70	8	.16	-----	-----
Illinois	161	358	.66	1,201	1.52	81	.10	1,801	2.27	1,389	1.75	28	.04
Indiana	80	117	.58	365	1.05	35	.10	743	2.18	133	.38	-----	-----
Iowa	37	39	.30	74	.29	9	.04	168	.66	111	.43	-----	-----
Kansas	44	25	.37	61	.33	10	.05	188	1.01	88	.47	1	.01
Kentucky	78	203	.95	40	.14	21	.07	539	1.82	282	.95	2	.01
Louisiana	267	-----	1.25	1	.004	-----	-----	486	2.27	111	.52	14	.07
Maine	12	1	.15	21	.24	3	.03	37	.43	23	.27	-----	-----
Maryland	87	17	.62	159	.94	10	.06	714	4.24	300	1.78	17	.10
Massachusetts	46	-----	.10	320	.72	23	.05	389	.88	292	.66	-----	-----
Michigan	89	101	.39	428	.88	86	.07	802	1.64	545	1.12	25	05
Minnesota	9	12	.08	209	.78	11	.04	246	.92	183	.69	2	.01
Mississippi	222	755	4 79	916	4.49	135	.66	4,485	21.90	2,480	12.16	1	.005
Missouri	167	478	1.60	207	.51	28	.07	942	2.34	266	.66	8	.02
Montana	10	-----	.18	13	.24	-----	-----	30	.55	15	.27	-----	-----
Nebraska	20	6	.10	28	.21	1	.01	55	.40	49	.36	-----	-----
Nevada	1	2	.20	10	.98	-----	-----	13	1.27	10	.98	1	.10
New Hampshire	-----	-----	-----	-----	-----	5	.10	14	.27	5	.10	-----	-----
New Jersey	86	120	.47	413	05	45	.10	713	1.63	238	.55	34	.08
New Mexico	22	5	.64	52	1.23	9	.21	89	2.11	30	.71	1	.02
New York	207	383	.45	2,442	1.88	151	.12	3,400	2.62	1,524	1.17	41	.03
North Carolina	178	709	2.51	627	1.78	116	.33	1,648	4.67	412	1.17	8	.02
North Dakota	6	5	.15	10	.14	6	.08	36	.51	28	.39	-----	-----
Ohio	196	249	.66	887	1.31	53	.08	1,385	2 05	103	.15	1	.001
Oklahoma	107	144	.98	223	.87	38	.15	767	2.98	388	1.51	-----	-----
Oregon	25	20	.43	80	.77	6	.06	132	1.27	117	1.13	-----	-----
Pennsylvania	151	400	.54	523	.51	44	.04	1,118	1.09	-----	-----	-----	-----
Rhode Island	2	8	.15	83	1.22	3	.04	107	1.57	50	.73	-----	-----
South Carolina	439	306	4.25	575	3.01	30	.16	1,428	7.55	85	.45	6	.03
South Dakota	27	7	.49	24	.35	6	.09	64	.92	18	.26	1	.01
Tennessee	317	494	2.77	823	2.81	65	.22	1,704	5.83	398	1.36	13	.04
Texas	227	340	.91	576	.92	79	.13	1,565	2.51	528	.85	49	.08
Utah	8	2	.10	36	.69	1	.02	47	.90	37	.71	-----	-----
Vermont	8	1	.10	8	.21	2	.05	14	.36	20	.52	-----	-----

See footnotes at end of table.

Reports from States—Continued

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis					
	Primary and secondary	Early latent	Rate per 10,000 population	Includes late latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Virginia [4]													
Washington	55	18	0.44	81	0.48	9	0.05	199	1.19	325	1.94	5	0.03
West Virginia	105	63	.88	104	.55	22	.12	556	2.92	291	1.53	2	.01
Wisconsin	17	20	.13	118	.40	6	.02	161	.55	104	.35	2	.01
Wyoming	22	6	1.18	31	1.31	1	.04	65	2.74	18	.76		
Puerto Rico [4]													
Virgin Islands [4]													
Total	4,683	7,777	.97	15,443	1.21	1,376	.11	35,860	2.80	14,029	1.10	325	.03

Reports from cities of 200,000 population or over

	Primary and secondary	Early latent	Rate per 10,000 population	Includes late latent	Rate per 10,000 population	Congenital number	Rate per 10,000 population	All syphilis number	Rate per 10,000 population	Gonorrhea number	Rate per 10,000 population	Other venereal diseases number	Rate per 10,000 population
Akron	2	16	0.65	38	1.38	1	0.04	57	2.07	19	0.69		
Atlanta		258	8.59	102	3.40			360	11.99	36	1.20	1	0.03
Baltimore	78	3	.97	134	1.60	4	.05	487	5.83	206	2.47	15	.18
Birmingham	70	26	3.26	63	2.14	16	.54	295	10.02	38	1.29		
Boston	12		.15	97	1.22	6	.08	128	1.61	118	1.48		
Buffalo	14	2	.27	85	1.41			101	1.68	63	1.05		
Cincinnati [4]													
Chicago	81	110	.62	710	1.94	34	.09	971	2.65	868	2.37	24	.07
Cleveland	44	35	.84	199	2.11	5	.05	283	3.00	112	1.19	3	.03
Columbus	21	28	1.56	47	1.50	5	.16	112	3.57	29	.93		
Dallas								235	7.73	119	3.92		
Dayton	8	12	.90	31	1.53	4	.18	58	2.62	28	1.26		
Denver								132	4.38	61	2.02		
Detroit	54	100	.85	359	1.98	14	.08	527	2.90	340	1.87	29	.16
Houston	44	66	3.07	112	3.13	18	.50	360	10.05	215	6.00	3	.08
Indianapolis	7		.18	19	.49	1	.03	87	2.26	29	.75		
Jersey City	6	4	.31	28	.86	5	.15	43	1.32	12	.37		
Kansas City [4]													
Los Angeles		129	.85	455	2.99	25	.16	609	4.00	388	2.55	1	.01
Louisville	9	91	2.95	3	.09	7	.21	172	5.07	70	2.07	7	.21
Memphis [1]													
Milwaukee	5		.08	62	.98	2	.03	69	1.10	20	.32	2	.03
Minneapolis	2	16	.36	14	.28	1	.02	43	.86	49	.98	1	.02
Newark	19	23	.92	143	3.15	9	.20	194	4.27	72	1.59	3	.07
New Orleans [4]													
New York	207	312	.69	1,680	2.24	107	.14	2,508	3.35	1,067	1.42	43	.06
Oakland	6	16	.51	73	2.33	3	.10	92	2.94	58	1.85	1	.03
Omaha	10	1	.49	11	.49			22	.98	16	.72		
Philadelphia [4]													
Pittsburgh								327	4.64	21	.30		
Portland	13	11	.75	41	1.28	1	.03	66	2.06	52	1.62		
Providence [4]													
Rochester	1		.03	27	.79	1	.03	29	.85	51	1.49		
St. Louis	50	165	2.55	305	3.62	13	.15	533	6.32	174	2.06	9	.11
St. Paul								36	1.25	15	.52		
San Antonio [4]													
San Francisco	41		.59	129	1.87	3	.04	173	2.51	189	2.74	5	.07
Seattle	21	17	.98	47	1.21	4	.10	91	2.35	134	3.46	1	.03
Syracuse		1	.04	64	2.84			65	2.88	8	.35		
Toledo	7	5	.39	67	2.15	4	.13	83	2.67	31	1.00	1	.03
Washington, D. C.								574	9.03	291	4.58	5	.08
Total	832	1,477	.90	5,148	2.00	293	.11	9,922	3.55	4,909	1.79	154	.07

[1] Figures preliminary and subject to correction.
[2] Includes "not stated" diagnosis.
[3] Duration of infection under 1 years.
[4] No report for current month.
[5] Includes early latent of less than 1 year's duration.
[6] Includes early latent, late, and late latent.

WEEKLY REPORTS FROM CITIES

City reports for week ended Aug. 17, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	81	26	11	249	267	235	3	338	76	1,273	--------
Current week[1]	28	20	2	332	188	166	1	308	48	1,145	--------
Maine:											
Portland	0	--------	0	1	2	0	0	0	0	8	17
New Hampshire:											
Concord	0	--------	0	0	0	0	0	0	0	0	4
Nashua	0	--------	0	0	0	0	0	0	0	0	4
Vermont:											
Barre	0	--------	0	1	0	0	0	0	0	0	3
Burlington	0	--------	0	0	0	0	0	0	0	0	9
Rutland	0	--------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	3	--------	0	24	7	6	0	12	1	72	184
Fall River	0	--------	0	3	0	0	0	0	0	5	25
Springfield	0	--------	0	2	0	1	0	1	0	0	32
Worcester	0	--------	0	15	2	0	0	1	0	6	49
Rhode Island:											
Pawtucket	0	--------	0	0	0	0	0	0	0	0	20
Providence	0	2	0	8	1	0	0	1	1	0	41
Connecticut:											
Bridgeport	0	--------	0	1	0	0	0	0	0	5	18
Hartford	0	--------	0	2	0	0	0	0	0	2	26
New Haven	0	1	0	0	0	3	0	0	0	3	34
New York:											
Buffalo	0	--------	0	1	2	1	0	5	0	5	112
New York	6	6	0	60	25	13	0	58	4	125	1,135
Rochester	0	--------	0	0	6	1	0	0	0	6	58
Syracuse	0	--------	0	0	2	1	0	0	0	18	28
New Jersey:											
Camden	0	--------	0	1	0	0	0	1	0	1	20
Newark	0	--------	0	30	1	8	0	10	0	26	88
Trenton	0	--------	0	0	2	0	0	1	1	0	32
Pennsylvania:											
Philadelphia	1	1	0	31	5	12	0	14	4	50	306
Pittsburgh	0	--------	0	1	8	1	0	8	3	27	126
Reading	0	--------	0	5	0	0	0	0	0	16	14
Scranton	0	--------	--------	1	--------	1	0	--------	2	0	--------
Ohio:											
Cincinnati	0	--------	0	1	3	0	0	3	1	16	113
Cleveland	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Columbus	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Toledo	0	--------	0	3	1	5	0	3	0	13	74
Indiana:											
Anderson	0	--------	0	0	0	1	0	0	0	0	8
Fort Wayne	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Indianapolis	1	--------	0	1	4	4	0	5	0	4	95
Muncie	0	--------	0	0	0	0	0	1	0	0	17
South Bend	0	--------	0	0	0	0	0	0	0	3	12
Terre Haute	0	--------	0	0	0	1	0	0	0	0	20
Illinois:											
Alton	0	--------	0	0	1	0	0	0	0	0	7
Chicago	4	1	0	16	10	28	0	44	3	92	540
Elgin	0	--------	0	2	0	0	0	0	0	3	7
Moline	0	--------	0	0	0	0	0	0	0	0	12
Springfield	0	--------	0	0	0	0	1	0	0	3	14
Michigan:											
Detroit	2	1	0	49	10	17	0	14	0	126	215
Flint	0	--------	0	0	0	1	0	0	2	4	19
Grand Rapids	0	--------	0	1	2	0	0	0	0	32	20
Wisconsin:											
Kenosha	0	--------	0	1	0	0	0	0	0	0	11
Madison	0	--------	0	1	0	0	0	0	0	4	16
Milwaukee	0	--------	0	30	2	4	0	4	1	8	93
Racine	0	--------	0	1	0	2	0	1	0	2	16
Superior	0	--------	0	1	0	1	0	0	0	1	7
Minnesota:											
Duluth	0	--------	0	0	0	0	0	0	0	9	14
Minneaplis	0	--------	1	2	4	4	0	3	0	7	97
St. Paul	0	--------	0	0	2	5	0	0	1	4	51

[1] Figures for Cleveland, Columbus, and Fort Wayne estimated; reports not received.

City reports for week ended Aug. 17, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	---	---	0	---	2	0	---	0	1	---
Davenport	0	---	---	0	---	0	0	---	0	2	---
Des Moines	0	---	0	0	0	3	0	0	0	0	27
Sioux City	0	---	---	0	---	0	0	---	0	0	---
Waterloo	0	---	---	0	---	0	0	---	0	3	---
Missouri:											
Kansas City	0	---	0	0	1	0	0	8	0	1	76
St. Joseph	0	---	0	0	1	0	0	1	1	0	25
St. Louis	0	---	0	1	12	3	0	7	4	12	189
North Dakota:											
Fargo	0	---	0	0	1	0	0	0	0	0	11
Grand Forks	0	---	---	0	---	0	0	---	0	1	---
Minot	0	---	0	0	0	0	0	0	0	0	7
South Dakota:											
Aberdeen	0	---	---	0	---	0	0	---	0	5	---
Nebraska:											
Lincoln	0	---	---	1	---	0	0	---	0	2	---
Omaha	0	---	0	0	2	0	0	0	0	1	52
Kansas:											
Lawrence	0	---	0	0	0	0	0	0	0	0	2
Topeka	0	---	0	1	0	2	0	0	0	3	23
Wichita	0	---	0	0	2	0	0	0	1	10	23
Delaware:											
Wilmington	0	---	0	0	1	0	0	0	0	5	28
Maryland:											
Baltimore	0	---	0	3	4	4	0	8	2	100	187
Cumberland	0	---	0	0	0	0	0	0	0	2	15
Frederick	0	---	0	0	0	0	0	0	0	0	5
Dist. of Col.:											
Washington	2	---	0	1	10	2	0	7	1	12	146
Virginia:											
Lynchburg	0	---	0	0	0	0	0	0	0	1	10
Norfolk	0	---	0	0	1	0	0	0	0	0	18
Richmond	0	---	0	2	1	0	0	2	0	0	42
Roanoke	0	---	0	0	0	0	0	0	0	1	9
West Virginia:											
Charleston	0	1	---	0	---	1	0	---	0	0	---
Huntington	0	---	---	0	---	1	0	---	0	0	---
Wheeling	0	---	0	0	0	2	0	1	0	2	18
North Carolina:											
Gastonia	0	---	---	0	---	0	0	---	0	3	---
Raleigh	0	---	0	0	0	1	0	1	0	0	8
Wilmington	0	---	0	0	2	0	0	0	0	5	10
Winston-Salem	1	---	0	0	1	2	0	2	0	9	16
South Carolina:											
Charleston	1	---	0	0	0	0	0	0	0	0	14
Florence	0	---	0	0	0	0	0	0	1	0	6
Greenville	0	---	0	0	1	0	0	0	0	11	14
Georgia:											
Atlanta	1	6	0	1	0	0	0	7	0	0	70
Brunswick	0	---	0	0	0	0	0	1	0	0	4
Savannah	0	---	0	0	0	0	0	1	2	0	31
Florida:											
Miami	0	---	0	0	6	0	0	0	0	0	35
Tampa	1	---	0	1	0	0	0	1	0	0	24
Kentucky:											
Ashland	0	---	0	0	0	0	0	0	0	1	8
Covington	0	1	---	0	---	0	0	---	0	4	---
Lexington	0	---	0	9	0	0	0	2	0	6	14
Louisville	2	---	0	0	0	3	0	2	0	26	54
Tennessee:											
Knoxville	0	---	0	0	0	0	0	0	0	0	31
Memphis	0	---	0	0	0	1	0	4	0	6	67
Nashville	0	---	0	0	0	0	0	2	4	10	45
Alabama:											
Birmingham	1	---	0	1	3	3	0	6	1	1	68
Mobile	0	---	1	1	1	2	0	0	0	0	28
Montgomery	1	---	---	0	---	0	0	---	0	1	---
Arkansas:											
Fort Smith	0	---	---	0	---	0	0	---	0	0	---
Little Rock	0	1	0	0	0	1	0	1	0	4	---
Louisiana:											
New Orleans	1	---	0	8	6	0	0	9	1	8	180
Shreveport	1	---	0	0	2	1	0	[illegible]	[illegible]	[illegible]	[illegible]

City reports for week ended Aug. 17, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Oklahoma:											
Oklahoma City	0	-------	0	0	0	1	0	8	0	0	26
Tulsa	0	-------	0	0	2	0	0	1	0	2	41
Texas:											
Dallas	1	-------	0	2	1	1	0	5	2	5	55
Fort Worth	0	-------	0	3	2	1	0	1	0	3	33
Galveston	0	-------	0	0	1	0	0	1	0	0	18
Houston	1	-------	0	0	1	1	0	7	1	0	86
San Antonio	0	-------	0	1	8	0	0	9	2	8	66
Montana:											
Billings	0	-------	0	0	0	0	0	0	0	0	9
Great Falls	0	-------	0	0	1	0	0	0	0	0	8
Helena	0	-------	0	0	0	0	0	0	0	0	5
Missoula	0	-------	0	0	0	0	0	0	0	0	7
Idaho:											
Boise	0	-------	0	0	0	0	0	0	0	0	3
Colorado:											
Denver	0	-------	0	2	2	2	0	5	1	11	87
Pueblo	0	-------	0	2	0	0	0	0	0	0	12
New Mexico:											
Albuquerque	0	-------	0	0	3	0	0	2	0	0	11
Utah:											
Salt Lake City	0	-------	0	11	2	0	0	0	0	20	37
Washington:											
Seattle	0	-------	0	1	4	2	0	1	0	5	81
Spokane	0	-------	0	0	0	0	0	0	0	1	37
Tacoma	0	-------	0	0	0	0	0	0	1	1	30
Oregon:											
Portland	0	-------	0	0	0	0	0	0	0	2	60
Salem	0	-------	-------	0	-------	0	0	-------	0	4	-------
California:											
Los Angeles	0	-------	0	3	4	8	0	8	0	69	304
Sacramento	0	-------	0	0	0	1	0	2	1	3	26
San Francisco	0	-------	0	2	5	2	0	7	1	28	157

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
New York:			
Buffalo	2	1	2
New York	1	0	2
Rochester	0	0	1
New Jersey:			
Newark	0	0	1
Pennsylvania:			
Philadelphia	0	0	1
Indiana:			
Muncie	0	0	1
South Bend	0	0	3
Illinois:			
Chicago	0	0	2
Michigan:			
Detroit	0	0	1
Grand Rapids	0	0	1
Wisconsin:			
Madison	0	0	1
Minnesota:			
St. Paul	0	0	8
Iowa:			
Des Moines	0	0	3
Sioux City	0	0	6
Waterloo	0	0	6
Missouri:			
Kansas City	0	0	5
Nebraska:			
Lincoln	0	0	2
Kansas:			
Wichita	0	0	2
District of Columbia:			
Washington	1	1	0
West Virginia:			
Huntington	0	0	9
Florida.			
Tampa	0	0	2
Kentucky:			
Ashland	0	0	4
Louisiana:			
Shreveport	0	1	2
Oklahoma:			
Oklahoma City	1	0	0
Texas:			
Dallas	1	0	5
Fort Worth	0	0	1
Houston	0	0	1
Washington:			
Seattle	0	0	1
Spokane	0	0	3
California:			
Los Angeles	0	0	8
Sacramento	0	0	1

Encephalitis, epidemic or lethargic.—Cases: Washington, 1; San Antonio, 1; Sacramento, 1.

Pellagra.—Cases: Baltimore, 1; Charleston, S. C., 2; Savannah, 3; Birmingham, 1; Dallas, 1; Los Angeles, 1; San Francisco, 1.

Typhus fever.—Cases: Brunswick, 1; Savannah, 1; Miami, 3; Tampa, 2; Birmingham, 1; Houston, 3.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 27, 1940.—During the week ended July 27, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					3			1		4
Chickenpox		12		162	151	27	44	1	19	416
Diphtheria		4		9	1	2	2			18
Dysentery							1		1	2
Influenza		5			20				43	68
Measles			5	111	166	70	47	8	25	432
Mumps				1	44	4	5		2	56
Pneumonia		1			4	3	2		10	20
Poliomyelitis				2	3					5
Scarlet fever			2	64	51	10	5	4	2	138
Tuberculosis		7	11	64	49	10	1	1		143
Typhoid and paratyphoid fever			5	14	3	1	1		1	25
Whooping cough		3	2	174	73	24	17	8	7	308

CUBA

Provinces—Notifiable diseases—4 weeks ended May 25, 1940.—During the 4 weeks ended May 25, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Ankylostomiasis		39					39
Cancer		4	3	3		5	15
Chickenpox		2		2	1	6	11
Diphtheria	1	17		5	1	3	27
Leprosy				2			2
Malaria	12	1		8	1	53	75
Measles		8		1		11	20
Scarlet fever		4					4
Trachoma		1					1
Tuberculosis	14	17	33	11	12	26	113
Typhoid fever	12	101	15	27	13	46	214
Whooping cough				9			9

Habana—Communicable diseases—4 weeks ended July 27, 1940.—During the 4 weeks ended July 27, 1940, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	9		Tuberculosis	1	
Malaria	2		Typhoid fever	75	8
Scarlet fever	1				

JAMAICA

Communicable diseases—4 weeks ended August 3, 1940.—During the 4 weeks ended August 3, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	8	15	Puerperal sepsis	1	1
Diphtheria		1	Tuberculosis	20	61
Dysentery	7	5	Typhoid fever	6	44
Leprosy		1			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of August 30, 1940, pages 1594–1597. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Manchuria.—A telegram dated August 17, 1940, reports 31 cases of cholera with 18 deaths in Shwangchenghsien, southwest of Harbin, Pinkiang Province, Manchuria.

India—Bombay.—During the week ended August 3, 1940, 2 cases of cholera were reported in Bombay, India.

Plague

China—Manchuria.—A telegram dated August 17, 1940, reports 45 cases of plague with 36 deaths in Nungan district northeast of Hsinking, Kirin Province, Manchuria.

Hawaii Territory—Island of Hawaii—Hamakua District.—One rat found July 17; 1, July 20; 2, July 22; and 1, July 24; all about one-half mile from the village of Paauilo, in the Hamakua Mill area, Island of Hawaii, T. H., have been proved positive for plague. Two rats found on August 2 and 3, respectively, within a half mile of Kukaiau Village, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

Peru.—During the month of June 1940, plague was reported in Peru, by Departments, as follows: Cajabamba, 1 case; Cajamarca, 5 cases; Libertad, 1 case; Lima, 1 case, 1 death; Tumbes, 5 cases, 1 death.

Thailand—Chingmai.—During the period August 3–17, 1940, 2 cases of plague (1 fatal) were reported in Chingmai, Thailand.

United States.—A report of plague infection in San Bernardino County, Calif., and in Sublette County, Wyo., appears on pages 1638 and 1639 of this issue of PUBLIC HEALTH REPORTS.

Yellow Fever

Colombia—Meta Department.—On July 31, 1940, a fatal case of yellow fever was reported in Meta Department, Colombia.

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Public Health Reports

VOLUME 55 SEPTEMBER 13, 1940 NUMBER 37

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE
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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

Vol. 55 • SEPTEMBER 13, 1940 • *No. 37*

RHEUMATIC HEART DISEASE IN PHILADELPHIA HOSPITALS [1]

A Study of 4,653 Cases of Rheumatic Heart Disease, Rheumatic Fever, Sydenham's Chorea, and Subacute Bacterial Endocarditis, Involving 5,921 Admissions to Philadelphia Hospitals From January 1, 1930, to December 31, 934

II. AGE, RACE, AND SEX DISTRIBUTION AND INTERRELATION OF RHEUMATIC FEVER, SYDENHAM'S CHOREA, RHEUMATIC HEART DISEASE, AND SUBACUTE BACTERIAL ENDOCARDITIS

By O. F. Hedley, *Surgeon, United States Public Health Service*

RELATION OF CASES TO ADMISSIONS

The relationship of cases to admissions presents many perplexing problems in the study of an essentially chronic disease such as rheumatic heart disease, which is usually initiated by acute conditions such as rheumatic fever and Sydenham's chorea, and whose course is not infrequently punctuated by recurrences of these conditions, exacerbations of other forms of rheumatic infection, and toward the end by recurrent episodes of congestive heart failure. Part I of this study,[2] which considers these diseases as a hospital problem, is based on admissions. From the viewpoint of hospitals, it matters little whether one case is admitted five times, or five cases are admitted once; the significant factor is the number of patient-days. Few hospitals make any effort to determine the number of individual cases treated, even on an annual basis.

It is not difficult to understand the possible pitfalls which might be encountered were admissions used as a basis for clinical studies. As a case in point, 2 patients were admitted on 41 occasions during the 5-year period under study. To have considered these 2 cases as 41

[1] From the Division of Infectious Diseases, National Institute of Health

[2] Hedley, O F Rheumatic heart disease in Philadelphia hospitals, part I Pub. Health Rep, 55: 1599

separate items would have weighted fictitiously certain statistics. One of the patients was a colored female in the 35–39 year age group who required 21 admissions, mostly of short duration, often overnight, for abdominal paracenteses. Since the total number of colored females was relatively small, the age distribution would have been influenced appreciably had statistics been computed on this basis.

There is apparently no simple or entirely satisfactory method for analyzing multiple admissions. To overcome this difficulty and to base the findings on the number of cases, the age of the patient as given at the time of the initial admission during the period under study was frequently used. It is believed that the use of initial admissions during the period under study serves as a satisfactory basis for determining the age distribution of hospital patients suffering from these diseases.

Fortunately, 81.7 percent of the patients were admitted only once, while 12.8 were hospitalized only twice during the period under study. Many of the patients admitted more than once were readmitted after short intervals; as a consequence their ages had not greatly changed.

In some instances the statistics were based on other findings, such as the age at onset as determined by the patient's history, the age at first attack in patients admitted for the first time with a rheumatic manifestation, the age during pregnancy, and other considerations. In each instance efforts have been made to state definitely the basis of the reckoning.

CONDITIONS UNDER STUDY

Of the 4,653 cases under study (table 1), 4,538, or 97.5 percent, were regarded as definitely having a rheumatic condition, while 115 were instances of subacute bacterial endocarditis superimposed on some other type of heart disease, apparently developing without pre-existing cardiac lesions, or in any event in which a definite relationship to rheumatic heart disease could not be determined. Even in some of these 115 cases it was not unlikely that rheumatic heart disease was an underlying factor; it could not be proved, however, with reasonable certainty.

Over 80 percent of patients with rheumatic conditions were diagnosed as having rheumatic heart disease. Nearly 30 percent had rheumatic fever; over 15 percent were indicated as having Sydenham's chorea. Excluding rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis as complications, there were 2,348 cases of uncomplicated rheumatic heart disease—51.7 percent of all rheumatic conditions.

TABLE 1.—*Number of cases and percentage of total cases of rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis admitted to 36 Philadelphia civilian hospitals from January 1, 1930, to December 31, 1934. Percentage based on rheumatic infections*

	Number	Percentage of cases
Total cases of rheumatic infections and subacute bacterial endocarditis	4, 653	----------
All rheumatic infections	4, 538	100
Rheumatic heart disease	3, 654	80. 5
Rheumatic fever with rheumatic heart disease	838	18. 5
Sydenham's chorea with rheumatic heart disease	[1] 289	6. 4
Rheumatic heart disease complicated by subacute bacterial endocarditis	209	4. 6
Uncomplicated rheumatic heart disease	2, 348	51. 7
Rheumatic fever without heart disease	486	10. 7
All rheumatic fever	1, 324	29. 2
Sydenham's chorea without rheumatic heart disease	[2] 398	8. 8
All Sydenham's chorea	687	15. 1
Subacute bacterial endocarditis not superimposed on rheumatic heart disease	115	----------
All subacute bacterial endocarditis	324	----------

[1] Including 30 in which rheumatic fever and chorea occurred during same admission.
[2] Including 11 in which rheumatic fever and chorea occurred during same admission.

RHEUMATIC FEVER

Etiological relation to rheumatic heart disease—a review of the literature.—A causal relationship between rheumatic fever and valvular heart disease was first described during the closing years of the eighteenth century (*1*). Some of the best clinical descriptions of these conditions extant are contained in yellowing and dust-covered records more than a century old. Haygarth (*2*), in 1805, was the first to write a monograph on this disease. So far as the writer has been able to determine, Haygarth was the first to call it "rheumatic fever." Winnowed from therapeutic concepts no longer tenable, Haygarth's work remains as an accurate account of the salient clinical features and natural history of rheumatic fever. Although rheumatic heart disease was not recognized as a disease entity, its symptoms are portrayed in descriptive detail. Changes in the blood are described which, with more refined technique, might readily be ascribed to leucocytosis. Haygarth even tabulated the frequency of epistaxis during rheumatic episodes.

Although Pitcairn and Jenner had spoken about the relationship of rheumatism to heart disease, it remained for Baillie and Dundas (*1*) to describe it. Even then, it was not until 1826 that Hawkins (*3*) in the Gulstonian lectures considered this problem in any great detail. His account antedates Bouillaud's (*4*) by 10 years, despite the fact that Bouillaud commonly has been given credit for the first accurate description of rheumatic endocarditis and for observing the regularity of its association with rheumatic fever. Even today rheumatic heart disease is known as Bouillaud's disease.

In recent years a number of studies have been made on both sides of the Atlantic Ocean, all affirming the importance of rheumatic fever as an etiological factor in rheumatic heart disease.

The results of 10 of the better known studies reported since 1920 are shown in table 2. In interpreting this table attention is invited to differences in the manifestations under consideration by various investigators. These are largely a question of definition. Except for Mackie's (*7*) and Brooks and O'Regan's series (*11*), these studies were confined almost exclusively to children. Just as high percentages of rheumatic heart disease are indicated, however, in the studies in which adults are included. Heart disease was diagnosed in 72.6 percent of this somewhat heterogeneous group of cases; of the 2,178 collected cases designated as rheumatic fever, acute rheumatism, and rheumatic arthritis, rheumatic heart disease was recognized clinically in 78.7 percent.

TABLE 2.—*Percentage of rheumatic infection with rheumatic heart disease, based on a review of 10 studies made in the United States and Great Britain since 1920*

Rheumatic manifestation	Number of cases	Percentage with heart disease	Author	Source	Location	Year	Reference
Acute rheumatism	172	66	Poynton et al.	Great Ormond Street Hospital.	London	1920	(*5*)
Rheumatic arthritis	100	75	Coombs	Bristol General Hospital.	Bristol	1924	(*6*)
Rheumatic fever	366	68.3	Mackie	Presbyterian Hospital	New York City.	1927	(*7*)
Rheumatic infection	413	79.5	Wilson et al.	Cornell University	do	1928	(*8*)
Rheumatism in children.	124	51	Campbell and Warner.	Guy's Hospital	London	1930	(*9*)
Rheumatic arthritis.	322	75	Findlay	Royal Hospital for Sick Children.	Glasgow	1931	(*10*)
Acute rheumatic fever.	700	84	Brooks and O'Regan.	Several sources		1932	(*11*)
Rheumatic infection	1,200	64	Kaiser	Survey	Rochester, N. Y.	1933	(*12*)
Rheumatic fever without chorea.	518	86	Jones and Bland	House of Good Samaritan.	Boston	1935	(*13*)
Rheumatic infection	445	66.1	Ash	Children's Hospital	Philadelphia.	1936	(*14*)

Age, race, and sex of 1,324 cases of rheumatic fever.—Table 3 shows the age, race, and sex distribution of 1,324 individual cases of rheumatic fever based on the age at initial admission during the period under study. In 838 cases, or 63.3 percent, the clinical records indicated that rheumatic heart disease was recognized, while in 486, or 36.7 percent, the records did not suggest rheumatic cardiac involvement. According to table 3 and figure 1, rheumatic fever is primarily a problem of childhood and early adult life. Only 5 percent of instances of rheumatic fever occurred among persons under 5 years of age, a point which will be discussed in detail in a consideration of the age at onset. Twenty and six-tenths percent of admissions occurred in each of the two quinquennia 5–9 years and 10–14 years. During the 15–19-year age period 13.4 percent of admissions were indicated. Altogether, 59.6 percent of admissions occurred among

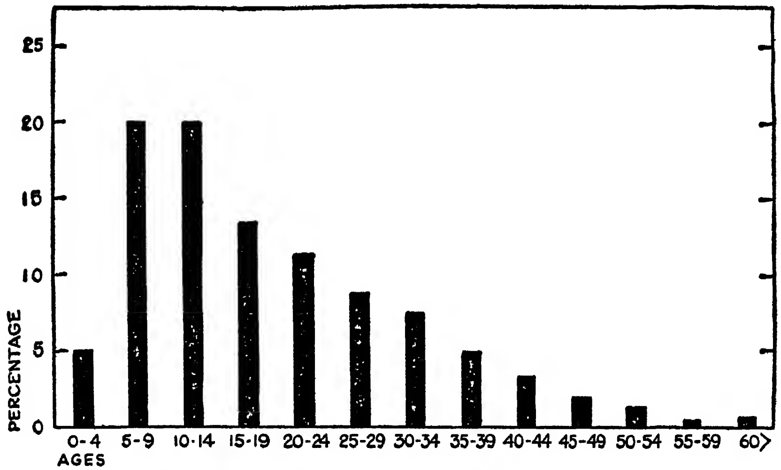

FIGURE 1.—Percentage distribution by 5-year age periods of 1,324 cases of rheumatic fever with or without heart disease, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during this period.

persons less than 20 years of age. With each succeeding age period, a smaller percentage of patients was admitted. Only 7.8 percent of initial admissions during the period under study were among patients older than 40 years.

TABLE 3.—*Age distribution by 5-year periods according to color and sex of 1,324 cases of rheumatic fever with or without heart disease or chorea among patients admitted to hospitals in Philadelphia from January 1, 1930, to December 31, 1934, based on ages at initial admissions during period under study*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	66	5.0	34	5.2	32	4.8	53	5.1	30	5.7	23	4.5	13	4.6	4	3.1	9	6.0
5-9	272	20.6	143	21.7	129	19.5	219	21.1	120	22.7	99	19.4	53	18.8	23	17.6	30	19.9
10-14	273	20.6	147	22.3	126	19.0	216	20.8	120	22.7	96	18.8	57	20.2	27	20.6	30	19.9
15-19	177	13.4	93	14.1	84	12.7	148	14.2	82	15.5	66	12.9	29	10.3	11	8.4	18	11.9
20-24	151	11.4	54	8.2	97	14.7	113	10.9	38	7.2	75	14.7	38	13.5	16	12.2	22	14.6
25-29	117	8.8	54	8.2	63	9.5	87	8.4	39	7.4	48	9.4	30	10.6	15	11.5	15	9.9
30-34	101	7.6	48	7.3	53	8.0	75	7.2	36	6.8	39	7.6	26	9.2	12	9.2	14	9.3
35-39	63	4.8	34	5.2	29	4.4	50	4.8	24	4.5	26	5.1	13	4.6	10	7.6	3	2.0
40-44	42	3.2	22	3.3	20	3.0	30	2.9	15	2.8	15	2.9	12	4.3	7	5.3	5	3.3
45-49	26	2.0	13	2.0	13	2.0	22	2.1	12	2.3	10	2.0	4	1.4	1	.8	3	2.0
50-54	19	1.4	10	1.5	9	1.4	14	1.3	7	1.3	7	1.4	5	1.8	3	2.3	2	1.3
55-59	6	.5	4	.6	2	.3	4	.4	2	.4	2	.4	2	.7	2	1.5	0	0
60 and over	9	.7	4	.6	5	.8	9	.9	4	.8	5	1.0	0	0	0	0	0	0
Undetermined	2	----	0	----	2	----	2	----	0	----	2	----	0	----	0	----	0	----
Total	1,324	----	660	----	664	----	1,042	----	529	----	513	----	282	----	131	----	151	----
Percentage of total	100	----	49.9	----	50.1	----	78.7	----	40.0	----	38.7	----	21.3	----	9.9	----	11.4	----
Mean age	19.6	----	19.3	----	19.9	----	19.8	----	18.6	----	20.2	----	20.4	----	21.9	----	19.0	----
Median age	16.4	----	15.3	----	17.6	----	16.1	----	14.8	----	17.8	----	18.1	----	20.2	----	16.8	----

The mean age of admissions was 19.6 years, the median age 16.4 years. Neither the mean nor median ages of admissions are as significant as the modal age of onset, a factor which will be discussed subsequently.

According to table 3, 78.7 percent of these 1,324 cases were white persons while 21.3 percent were colored. This suggests that race is not a factor of very great importance; certainly there does not seem to be any tendency for the disease to be less common among colored persons. The age distribution is not appreciably influenced on the basis of race. The mean ages are about the same; the median age among the colored is 18.1 and among white persons, 16.1 years.

Studies by most writers including Coombs (*6*), Wilson and her associates (*8*), Findlay (*10*), Kaiser (*12*), Sutton (*15*), Brenner (*16*), and others indicate that rheumatic fever is more common in females than males, in the ratio of 55:45 to 60:40. Mackie (*7*), on the other hand, found that it was equally distributed according to sex. Brooks and O'Regan (*11*) noted that it was considerably more common in males; their series was obtained largely from admissions to an adult ward service and may not have been sufficiently representative. Roth, Lingg, and Whittemore (*17*) noted that rheumatic heart disease is about equally distributed according to sex, and that rheumatic polyarthritis is more likely to occur as the primary manifestation in males. Swift (*18*) states that although polyarthritis is more commonly seen in men than in women, taking all manifestations of rheumatic infection into consideration, females are affected more often than males.

Table 3 also indicates that the distribution of admissions for rheumatic fever is about equal on the basis of sex. In fact, among white persons males predominated slightly; among colored persons the reverse obtained. Even among children there were about as many cases in one sex as the other.

Except for an appreciably greater percentage of cases among persons under 20 years of age, the age distribution of rheumatic fever with heart disease is closely comparable to rheumatic fever without heart disease. Sixty-six percent of rheumatic fever with heart disease occurred during the first two age decades; only 48.6 percent of rheumatic fever without heart disease was indicated during that age period (table 4). Less than 10 percent in either group was indicated among persons past 40 years of age. This suggests that most of the diagnoses of rheumatic fever at all age periods were made in accordance with commonly accepted standards, and that few cases of rheumatoid and infectious arthritis were erroneously diagnosed as rheumatic fever.

TABLE 4.—*Age distribution by 5-year periods of 1,324 cases of rheumatic fever, 838 of which were diagnosed as having rheumatic heart disease, and 486 not diagnosed as having rheumatic heart disease, in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the ages at initial admission during the period under study. Also percentage of cases of rheumatic fever with heart disease in each age period*

Age (years)	All rheumatic fever		Rheumatic fever with heart disease		Rheumatic fever without heart disease		Percentage with heart disease
	Number	Percent	Number	Percent	Number	Percent	
Under 5	66	5.0	43	5.1	23	4.7	65.2
5-9	272	20.6	190	22.7	82	16.9	69.9
10-14	273	20.6	193	23.1	80	16.5	70.7
15-19	177	13.4	126	15.1	51	10.5	71.2
20-24	151	11.4	88	10.5	63	13.0	58.3
25-29	117	8.8	67	8.0	50	10.3	57.3
30-34	101	7.6	52	6.2	49	10.1	51.5
35-39	63	4.8	20	2.4	43	8.8	31.7
40-44	42	3.2	26	3.1	16	3.3	61.9
45-49	26	2.0	14	1.7	12	2.5	53.8
50-54	19	1.4	12	1.4	7	1.4	63.2
55-59	6	.5	2	.2	4	.8	33.3
60 and over	9	.7	3	.4	6	1.2	33.3
Unknown	2	----------	2	----------	0	0	----------
Total	1,324	100	838	100	486	100	63.3

The age distribution of clinical cases in Philadelphia hospitals is greatly at variance with the age distribution of 370 deaths reported as due to rheumatic fever by physicians in Philadelphia to the State Office of Vital Statistics during the same 5-year period:

Age (years)	*Number of deaths*	*Percentage*
Under 10	68	18.4
10-19	88	23.8
20-29	66	17.8
30-39	54	14.6
40-49	34	9.2
50-59	14	3.8
60 and over	46	12.4
	370	100

Compared with table 4, the age distribution of deaths reported as due to rheumatic fever is out of line in many respects with the age distribution of clinical cases in hospitals. It is not unlikely that, if morbidity from rheumatic fever were made notifiable among persons at all ages, various forms of arthritis and other conditions common among persons past 40 years of age would not infrequently be reported as rheumatic fever. Atwater (*19*) has also commented upon the lack of agreement between the age distribution of clinical diagnosis of rheumatic fever and mortality attributed to this condition.

Percentage of rheumatic fever with rheumatic heart disease.—According to table 4, clinical evidence of heart disease was recognized in 63.3 percent of 1,324 cases of rheumatic heart disease during initial admission to Philadelphia hospitals during the period under study. This percentage is not as great as indicated by most writers (see table 2).

The most probable explanation is that this series was confined solely to hospital cases, while other writers usually had the opportunity to follow their patients after discharge. Often a definite diagnosis of rheumatic heart disease cannot be made without protracted observation. Most of the studies described in table 2 are confined almost exclusively to children; however, the percentage of rheumatic heart disease was at least equally as high in Brooks and O'Regan's (*11*) and Mackie's (*7*) series. Probably none of these studies is based on as representative or unselected a group of cases as the present series.

It is also likely that there has been a diminution in the severity of rheumatic fever since some of the studies listed in table 2 were made. A tendency in this direction has been noted by Atwater (*19*), Swift (*18*), the writer (*21*), and the experience of the Metropolitan Life Insurance Company (*22*). Ash (*14*) recently expressed the view,

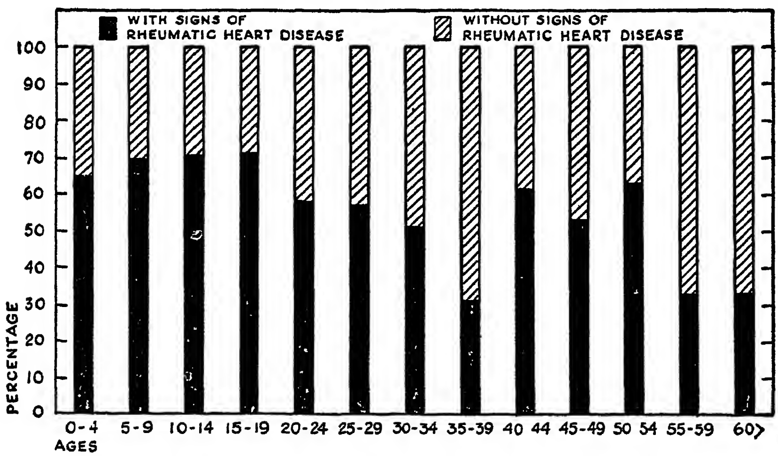

FIGURE 2.—Percentage of 1,324 cases of rheumatic fever by 5 year age groups, in which a diagnosis of rheumatic heart disease was made, based on initial admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

based on a follow-up study of cases at the Philadelphia Children's Hospital, that the disease was becoming milder.

It is also not unlikely that physicians are now more conservative in diagnosing rheumatic heart disease than they were a decade ago. Owing to the widespread adoption of the criteria for diagnosis of the American Heart Association (*23*), it is possible for a physician to make the diagnosis of *potential* heart disease in patients who have rheumatic fever but without definite evidence of cardiac involvement, or of *possible* heart disease in patients with equivocal signs of heart disease. Final opinion is often withheld for some time pending developments.

Table 4 and figure 2 indicate that rheumatic heart disease develops in about 70 percent of patients under 20 years of age during hospital

admission. In each succeeding 5-year period subsequent to 20 years of age a smaller percentage of rheumatic heart disease was indicated, until the 35–39-year age period in which only 31.7 percent of cases were recognized as having rheumatic heart disease. During the three 5-year periods, 40–54 years, higher percentages of heart disease were indicated, a tendency not observed by Mackie (7). Among the very small number of cases in patients over 55 years of age only a third were diagnosed as having rheumatic heart disease. Figure 2 should be interpreted in the light of table 4, taking into consideration the small number of cases among persons over 40 years of age.

Age distribution of onset of rheumatic fever.—The clinical records of 2,734 cases indicated a history of rheumatic fever. In 862 instances

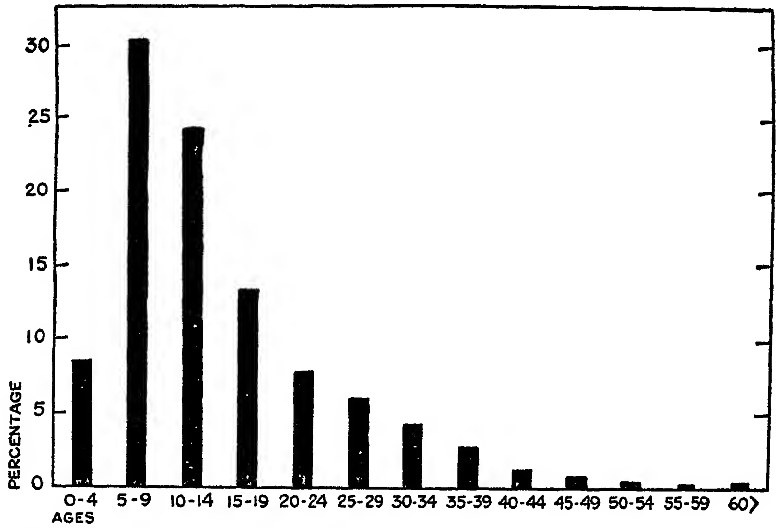

FIGURE 3.—Percentage distribution by 5-year age periods of 2,539 first attacks of rheumatic fever, with or without rheumatic heart disease, based on past or present histories, among cases admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

the onset of rheumatic fever occurred during a current admission, while in 1,872 cases the onset of rheumatic fever antedated the first admission under study. Of these 2,734 attacks of rheumatic fever, the age at onset was recorded in 2,539, or 92.9 percent. In the other 195 cases a history of rheumatic fever was admitted, but the age at first attack was either not given or was indefinite.

Table 5 and figure 3 record the ages at onset of 2,539 cases of rheumatic fever, based on current admissions or previous histories. These indicate that 8.5 percent of rheumatic fever develops during the age period under 5 years, 30.1 percent during the 5–9-year age period, 24.5 percent during the 10–14-year age period, 13.3 percent during the 15–19-year age period, 7.8 percent during the 20–24-year age period, 6.1 percent during the 24–29-year age period, 4.3 percent

during the 30–34-year age period, 2.8 percent during the 35–39-year age period, and only 2.7 percent among persons older than 40 years.

TABLE 5.—*Age distribution by 5-year age groups, according to race and sex, of the first attacks of 2,539 cases of rheumatic fever with or without heart disease, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the age at first admission or on history of the age at first attack*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	215	8.5	82	7.1	133	9.7	194	9.1	71	7.2	123	10.7	21	5.2	11	6.3	10	4.4
5–9	765	30.1	348	29.9	417	30.3	655	32.1	318	32.2	367	31.9	80	19.9	30	17.2	50	21.9
10–14	622	24.5	281	24.2	341	24.8	522	24.4	245	24.8	277	24.1	100	24.9	36	20.7	64	28.1
15–19	337	13.3	169	14.5	168	12.2	279	13.1	144	14.6	135	11.7	58	14.4	25	14.4	33	14.5
20–24	197	7.8	88	7.6	109	7.9	148	6.9	64	6.5	84	7.3	49	12.2	24	13.8	25	11.0
25–29	155	6.1	68	5.9	87	6.3	114	5.3	49	5.0	65	5.7	41	10.2	19	10.9	22	9.6
30–34	109	4.3	51	4.4	58	4.2	84	3.9	39	3.9	45	3.9	25	6.2	12	6.9	13	5.7
35–39	70	2.8	37	3.2	33	2.4	56	2.6	28	2.8	28	2.4	14	3.5	9	5.2	5	2.2
40–44	31	1.2	17	1.5	14	1.0	23	1.1	13	1.3	10	.9	8	2.0	4	2.3	4	1.8
45–49	18	.7	7	.6	11	.8	15	.7	6	.6	9	.8	3	.7	1	.6	2	.9
50–54	10	.4	9	.8	1	.1	9	.4	8	.8	1	.1	1	.2	1	.6	0	0
55–59	3	.1	2	.2	1	.1	1	.1	0	0	1	.1	2	.5	2	1.1	0	0
60 and over	7	.3	3	.3	4	.3	7	.3	3	.3	4	.4	0	0	0	0	0	0
Total	2,539	100	1,162	100	1,377	100	2,137	100	988	100	1,149	100	402	100	174	100	228	100
Percentage of total	----	----	----	45.8	----	54.2	----	84.2	----	38.9	----	45.3	----	15.9	----	6.9	----	9.0
Mean age	14.5	----	15.0	----	14.1	----	14.0	----	14.4	----	13.7	----	17.3	----	18.5	----	16.3	----
Median age	12.3	----	12.7	----	12.0	----	11.8	----	12.1	----	11.5	----	15.0	----	17.0	----	14.2	----
Modal age	8.7	----	8.9	----	8.6	----	8.6	----	8.9	----	8.5	----	12.1	----	12.3	----	12.0	----

The percentage distribution of ages of onset of 862 cases of rheumatic fever which were admitted during the first attack of fever was essentially similar to the age of onset of these 2,734 cases, in 1,872 of which the onset of rheumatic fever occurred prior to this study. On the basis of age decades, the age distribution for these 862 cases was as follows:

Age (years)	*Number*	*Percentage*
Under 10	283	32.8
10–19	306	35.5
20–29	147	17.1
30–39	81	9.4
40 and over	42	4.9
Unknown	3	.3
	862	100

Compared with table 5, these percentages suggested a slightly older age distribution among cases with onset during an admission under study, due probably to a larger proportion of rheumatic fever without heart disease in this group.

Of the 215 cases of rheumatic fever in which the initial attack occurred in persons less than 5 years of age, none occurred in infants

of less than 1 year; 17 occurred among persons 1 year old, and 37 among persons 2 years old; in the other 161 cases the first rheumatic episode developed in children 3 and 4 years old. Of the 54 instances in which the onset of rheumatic fever occurred under 3 years of age, only 8 attacks occurred during an admission under study. The relative rarity of rheumatic fever during infancy has been commented upon frequently. Paul (*24*), citing its extreme infrequency among infants, mentions that only 40 cases in children less than 1 year of age have been reported in the literature. Kissane and Koons (*25*) demonstrated a case of intrauterine rheumatic heart disease in which the diagnosis was confirmed post mortem. The mother had rheumatic fever at 12 years of age and a severe recurrence during pregnancy. They also reviewed the literature and cited 4 other cases. Richdorf and Griffith (*26*) reported a case of polyarthritis in a 6-day-old infant whose mother had rheumatic fever during pregnancy. White (*27*) also comments upon the rarity in infancy. Denzer (*28*) reported 3 cases of rheumatic heart disease in children under 2 years of age; 2 were confirmed post mortem. McIntosh and Wood (*29*) reported 24 instances of rheumatic heart disease during the first 3 years of life; in 6 the diagnosis was sustained by necropsy. Eigen (*30*) and Fisher (*31*) also cite examples of rheumatic infection in infancy.

The onset of the greatest number of cases, 30.1 percent, was indicated during the age period 5–9 years. The mode, or age of greatest frequency, of the 2,539 cases in which the age at onset was recorded, was 8.9 years. The mode of the 862 cases in which the onset of rheumatic fever occurred during an admission under study was 10.5 years. The mean age at onset of the 2,539 cases, most of which developed prior to admission, was 14.5 years, and the median age at onset, or midpoint of greatest frequency, was 12.3 years.

The mode age at onset is in agreement with the findings of a number of investigators (table 6), all of whom, with 2 exceptions, were concerned only with rheumatic infection in childhood. The mean age at onset is greater by several years than reported by most writers, because this series comprises cases at all ages; most of the series in table 6 are limited to children less than 12 years of age. The mean age of any series is largely dependent on the range of ages under consideration and for that reason is not considered as significant as the mode. The fact that the mean of onset determined by many investigators of rheumatic infection in childhood coincides so closely with the mode is largely fortuitous. The median age is somewhat more significant but is also dependent in a large measure on the spread of a series.

TABLE 6.—*Age at onset of rheumatic infection, based on review of the literature*

Diagnosis	Number of cases	Source	City	Age (years)	Basis	Author	Remarks	Reference
First rheumatic manifestation	131	Children's Heart Hospital	Philadelphia	7.3	Mean	Stroud et al.	Children only	(32)
Do	445	Children's Hospital	do	6.8	do	Ash	do	(14)
Do	1,126		Rochester, N. Y.	10	Mode	Kaiser	do	(12)
Rheumatic arthritis	364	Royal Hospital for Sick Children.	Glasgow, Scotland	7.0	do	Findlay	do	(10)
Rheumatic fever and chorea	623	Several sources	New York	7–9	do	Sutton	do	(15)
Rheumatic carditis	253	Bristol General Hospital	Bristol, England	10.2	Mean	Coombs	do	(6)
Rheumatic infection	413	Cornell University	New York	7.3	do	Wilson et al.	do	(8)
Rheumatic infection	713	Lymanhurst Sanatorium	Minneapolis	5–6	Mode	Shapiro	do	(33)
Acute rheumatism	172	Great Ormond Street Hospital.	London	7	do	Poynton et al.	do	(5)
Rheumatic cardiac disease	128	King's County Hospital	Brooklyn	6	do	Taran	do	(34)
Rheumatism and chorea	250	Guy's Hospital	London	7–8	do	Campbell and Warner	do	(9)
Initial rheumatic infection	458	Mt. Sinai Hospital	New York	8	Mean	Roth et al.	do	(17)
Do	488	do	do	7	Mode	do	do	(17)
Rheumatic fever	383	Presbyterian Hospital	do	10–15	do	Mackie	All ages	(7)
Initial rheumatic infection	614	Bellevue Hospital	do	0–11	do	DeGraff and Lingg	All ages (fatal cases)	(35)
Do	644	do	do	16.8	Mean	do	do	(35)
Do	611	do	do	14	Median	do	do	(35)
Rheumatic fever	500	Yale University	New Haven	7	Mode	Leonard	Children only	(36)

The study by DeGraff and Lingg (*35*) was more nearly comparable to this study than any other recorded in table 6. DeGraff and Lingg investigated 1,633 patients with rheumatic heart disease seen for the most part in the adult cardiac clinic of the Bellevue Hospital in New York City. They analysed in detail the age at onset and history of 644 fatal cases, supplementing this group with cases obtained from other sources to overcome certain obvious possible sources of error. Based on these adjusted curves, they placed the mean age of onset at 16.8 years and the median age of onset at 14 years. The mode falls earlier at 9, 10, and 11 years, corresponding quite closely to that of 8 years reported by Wilson, Lingg, and Croxford (*8*) and to 8.7 years as indicated in this study (table 5).

Approaching the problem from a somewhat different point of view, Paul (*37*) found that susceptibility to rheumatic fever was greatest in the age group 5–12 years and reached its peak at about the age of 7 years. His studies were based on an investigation of the spread of rheumatic infection in families in which two or more individuals had suffered from evidences of rheumatic fever.

In the present study no great differences were indicated in the age distribution, and the mean, median, and modal ages of onset on the basis of sex (table 5). It should be noted, however, that among the 2,539 cases with a definite history of rheumatic fever, 54.2 percent were females and only 45.8 percent were males. This is in contrast to table 3 in which the distribution according to sex was approximately equal. The distribution according to sex by 5-year age periods suggests that rheumatic fever is more likely to develop in younger females while among older persons it is more likely to occur among males, a tendency noted by Swift (*18*) and by DeGraff and Lingg (*35*).

An onset of rheumatic fever at somewhat older ages among colored persons than white persons was indicated. The greatest percentage of first attacks among colored persons occurred during the 10–14-year age period as compared with the 5–9-year age period among white persons. A greater susceptibility to rheumatic fever among colored adults is suggested by the fact that 32.1 percent of rheumatic fever developed during the two age decades 20–39 years, as compared with only 18.7 percent among white persons. This difference may be due in part to peculiarities in the age distribution of the colored population of Philadelphia because of the migration from the South of a large number of young adults during recent years. Boas (*38*) has pointed out the severity of rheumatic carditis in adult Puerto Rican immigrants in New York City; he did not suggest, however, that the incidence of rheumatic fever was greater among that group. Part III of this series of articles and a study by the writer (*39*) indicate an unusually high percentage of deaths from rheumatic heart disease among Negro males aged 10–19 years. The fact that a relatively large number of

cases of rheumatic fever have their onset during this age period, especially during the 10–14-year period, suggests that rheumatic heart disease is more likely to occur in an extremely severe form among young Negro males. To what extent this is due to improper facilities or failure to cooperate in treatment cannot be estimated. It is the impression of the writer, based on the observation of clinical cases, that rheumatic infection attacks Negro boys with greater than average severity.

Another possibility for the apparently greater percentage of rheumatic fever in colored adults is that they may have failed to a greater extent to remember rheumatic episodes in earlier life. In none of the

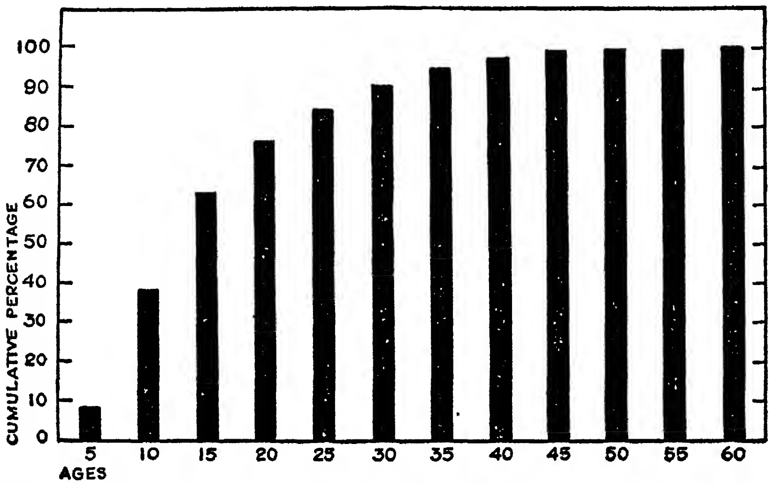

FIGURE 4.—Cumulative percentage by 5-year age periods of 2,539 first attacks of rheumatic fever, with or without rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934, and based on past or present histories of rheumatic fever.

race-sex groups was there indication that many cases developed among persons past 40 years of age.

Cumulative percentage of age of onset.—According to table 5 and figure 4 the onset of 8.5 percent of rheumatic fever occurred prior to 5 years of age, 38.6 percent prior to 10 years, 63.1 percent prior to 15 years, 76.4 percent prior to 20 years, 84.2 percent prior to 25 years, 90.3 percent prior to 30 years, and only 2.7 percent among persons past 40 years of age.

Over three-fourths of the cases of rheumatic fever have their onset during the first two decades of life. This is indicative of the fact that rheumatic fever is primarily a problem of childhood and adolescence. Measures directed toward the prevention of rheumatic heart disease or the amelioration of its effects should largely be concentrated on rheumatic infection among persons under 20 years of age, because not only is rheumatic fever more likely to occur during that period

but rheumatic heart disease is more likely to develop, and with greater severity.

It is a mistake, however, to regard rheumatic fever as exclusively a disease of childhood. The designations "juvenile rheumatism" and "childhood rheumatism" are greater misnomers than "infantile paralysis," a term which investigators of anterior poliomyelitis regard as most unfortunate. "Juvenile rheumatism" is particularly inappropriate because, unlike anterior poliomyelitis, rheumatic fever is often the primary manifestation of an essentially chronic disease subject to recrudescences and exacerbations. Unlike anterior poliomyelitis, recurrences of rheumatic fever are more nearly the rule than the exception. Signs of rheumatic activity may occur at any age.

SYDENHAM'S CHOREA

Etiological relation to rheumatic heart disease—a review of the literature.—There was no doubt in the minds of the earlier writers concerning the role of Sydenham's chorea as a cause of acquired heart disease in young persons.

Osler (*42*) stated: "Acute endocarditis, commonly of the mitral leaflets, occurs with great frequency in chorea, and the remarkable statement that there is no other disease, not even acute rheumatism, which is so frequently accompanied by valvulitis, seems justifiable.

"The extraordinary frequency with which mitral valvulitis is met with in fatal cases is remarkable. *There is no known disease in which endocarditis is so constantly found, post-mortem, as chorea;* it is exceptional to find the heart healthy." [Italics Osler's.]

Osler noted the occurrence of heart murmurs among 170, or 30.7 percent, of 554 cases of chorea in Philadelphia; in 149 the murmurs were apical in maximum intensity; in 21 basic. Over 51 percent of 140 cases of Sydenham's chorea followed for at least 2 years presented definite signs of damage to the heart. Among 73 collected cases of chorea studied post mortem, cardiac lesions of the rheumatic type were demonstrated in 90.4 percent.

Stephen Mackenzie (*40*) in a collective investigation for the British Medical Association reported that 32 percent of 439 patients had varying degrees of cardiac affection during attacks of chorea. Sturges (*41*) noted that 34 percent of 132 cases presented signs of organic cardiac involvement. Heart disease was indicated in 44 percent of Coombs' (*6*) series of 100 cases.

The percentage of cases of Sydenham's chorea reported by a number of investigators as manifesting signs of rheumatic heart disease is shown in table 7, and varies from 3 percent to 77.3 percent. To a certain extent it is dependent on the length of observation, but this is by no means invariable. Thayer (*43*) and Strong (*48*) emphasized

that cardiac involvement increases in proportion to the number of attacks of chorea.

TABLE 7.—*Review of the literature indicating percentage of rheumatic heart disease in Sydenham's chorea*

Number of cases of chorea	Percentage with rheumatic heart disease	Author	Source	Location	Year	Reference
489	32	Mackenzie	Survey for British Medical Association.	London	1887	(*40*)
182	34	Sturges	Personal observations	do	1893	(*41*)
140	51	Osler	Philadelphia Infirmary for Nervous Diseases.	Philadelphia	1894	(*42*)
689	25.4	Thayer	Johns Hopkins Hospital	Baltimore	1906	(*43*)
800	63	Frazer	Paddington Green Hospital	London	1912	(*44*)
226	86	Abt and Levinson	Sarah Morris Hospital	Chicago	1916	(*45*)
138	26	Helmholtz		do	1916	(*46*)
319	72	Koplik	Personal observations	New York	1919	(*47*)
100	45	Strong	Peter Bent Brigham Hospital.	Boston	1923	(*48*)
100	44	Coombs	Bristol General Hospital	Bristol	1924	(*6*)
66	51	Mackie	Presbyterian Hospital	New York	1926	(*7*)
47 (pure)	34	Campbell and Warner	Guy's Hospital	London	1930	(*9*)
75 (mixed)	56	do	do	do	1930	(*9*)
845	59	Findlay	2 large hospitals	Glasgow	1931	(*10*)
215	41.5	Wallace	Royal Infirmary	Edinburgh	1933	(*49*)
134 (pure)	8	Jones and Bland	House of Good Samaritan	Boston	1935	(*13*)
348 (mixed)	73	do	do	do	1935	(*13*)
45	27	Gerstley et al	Several sources	Chicago	1935	(*50*)
75 (pure)	77.3	Schwarz and Leader	Mt. Sinai Hospital	New York	1935	(*51*)
45 (pure)	13.3	Ash	Children's Hospital	Philadelphia	1936	(*14*)
87 (mixed)	71.5	do	do	do	1936	(*14*)
78 (pure)	53	Parrish et al	Kings County Hospital	Brooklyn	1937	(*52*)
84 (mixed)	76	do	do	do	1937	(*52*)
91 (pure)	20	Sutton and Dodge	Bellevue Hospital	New York	1938	(*53*)
243 (mixed)	75	do	do	do	1938	(*53*)
49 (mixed)	65	Usher	Children's Hospital	Montreal	1938	(*54*)
56 (pure)	14	do	do	do	1938	(*54*)

Total: All chorea—46.5 percent of 4,616 cases.
"Pure" chorea—28.8 percent of 526 cases.
"Mixed" chorea—71.6 percent of 836 cases.

During recent years doubt has been expressed concerning the relationship of Sydenham's chorea to rheumatic infection and its place in the etiology of rheumatic heart disease. Several writers have questioned whether so-called "pure" chorea, i. e., chorea without clinical or laboratory evidence of infection, should be regarded as part of the rheumatic syndrome, or at least more than a rather mild rheumatic manifestation accompanied very infrequently by cardiac damage. They point out that when endocarditis supervenes there are almost invariably other signs of rheumatic infection.

Among the proponents of this view are Coburn and Moore (*55*), Jones and Bland (*13*), Usher (*54*), and Gerstley, Wile, Falstein, and Gayle (*50*). Coburn and Moore (*55*) state that in their experience one-half of all cases of chorea occur in individuals without other rheumatic manifestations and with normal sedimentation rates. They go so far as to state definitely that they do not regard chorea *per se* as sufficient evidence for the diagnosis of rheumatic infection. Jones and Bland (*13*) found that only 3 percent of "pure" chorea developed rheumatic

heart disease as compared with 73 percent of "mixed" chorea, i. e., chorea with other rheumatic manifestations. Usher (*54*) found evidence of heart disease in 65 percent of chorea in combination with rheumatism and other signs of infection as compared with only 14 percent of "pure" chorea. He regards heart disease as not due to chorea but to intercurrent infections. Gerstley and his associates (*50*) state that only 6 of 150 cases of chorea gave definite histories of rheumatic fever, and only 12 had endocarditis. They regard histories of uncomplicated chorea as infrequent in patients with rheumatic heart disease and do not regard chorea as a manifestation of rheumatic fever, but as due to psychic trauma in predisposed individuals.

Parrish, Taran, and Starr (*52*), Sutton and Dodge (*53*), and Schwarz and Leader (*51*) regard chorea as an important manifestation of rheumatic infection, prone to result in rheumatic heart disease. Parrish, Taran, and Starr found evidence of heart disease in 53 percent of "pure" chorea as compared with 76 percent of "mixed" chorea. They state, "Until the etiological agent is known, it is reasonable to assume that chorea is one of the rheumatic manifestations." They indicate that chorea occurs in the same type of children and under environmental conditions similar to rheumatic fever. Sutton and Dodge (*53*) indicate that heart disease develops in 20 percent of those who have had chorea as the only rheumatic manifestation, as compared with 75 percent of "mixed" chorea. They state that the child in whom the rheumatic state is initiated with an attack of chorea has a 50 percent chance of developing heart disease. They conclude, "Chorea should continue to be regarded not only as a manifestation but as a serious manifestation of rheumatic infection." Schwarz and Leader (*51*) followed 75 cases of "pure" chorea over a period of 1 to 12 years and found cardiac involvement in 77.3 percent; they concluded that chorea is followed by heart disease in most cases.

Ash (*14*), in Philadelphia, takes a view between these extremes, and regards chorea as a mild rheumatic manifestation in which heart disease is much less likely to develop when other signs of rheumatic infection are absent. Heart disease was exhibited in only 13.3 percent of 45 cases of "pure" chorea observed over an average period of 7½ years, as compared with 71.5 percent of 87 cases of chorea with joint pains. The incidence of heart disease in cases of chorea with arthritic manifestations was even slightly higher than the incidence in cases of rheumatic arthritis alone.

To the writer these attempts to divide chorea into "pure" and "mixed" forms appear somewhat arbitrary, although it is true that heart disease is less likely to develop in Sydenham's chorea unattended by other signs of rheumatic infection. The inconsistency of this over-refinement of diagnosis is that when a case of "pure" chorea

develops any other rheumatic manifestation, it is immediately placed in the "mixed" category.

The fact remains that a child with Sydenham's chorea stands an infinitely greater chance of developing rheumatic heart disease. For example, approximately 1 percent of children have rheumatic heart disease. At least a fifth of these have histories of chorea. On this basis, rheumatic heart disease occurs in approximately 0.8 percent of children without histories of chorea. According to table 7, rheumatic heart disease was indicated in 46.5 percent of 4,616 cases of chorea collected from the literature. Even among 526 instances of so-called "pure" chorea, rheumatic heart disease was diagnosed in 28.8 percent. Judged by these standards, a child with chorea has a 5,700 percent greater chance of developing heart disease; a child with so-called "pure" chorea stands approximately a 3,500 percent greater opportunity of having heart disease than a nonchoreic child. Even on the basis of Jones and Bland's (*13*) finding of 3 percent of rheumatic heart disease in so-called pure chorea, the incidence is about 275 percent higher than estimated in nonchoreic individuals.

Age, race, and sex of 687 cases of Sydenham's chorea.—Table 8 shows the age distribution, by 5-year periods, according to color and sex, of 687 cases of Sydenham's chorea, based on the age at the initial admission during the period of this study. Of these 687 cases of Sydenham's chorea, 289, or 42.1 percent, also exhibited signs of rheumatic heart disease, while in 398 cases, or 57.9 percent, heart disease was not recognized during hospital residence.

TABLE 8.—*Age distribution, by 5-year age periods, according to race and sex, of 687 cases of Sydenham's chorea with or without rheumatic heart disease or rheumatic fever admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the age of the patient during the initial admission in the period under study*

Age (years)	Total						White						Colored		
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes (number)	Male (number)	Female (number)
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent			
Under 5	18	2.6	6	2.5	12	2.7	16	2.5	5	2.2	11	2.6	2	1	1
5-9	319	46.5	131	55.0	188	42.0	305	47.2	124	55.1	181	43.0	14	7	7
10-14	297	43.3	94	39.5	203	45.3	279	43.2	90	40.0	189	44.9	18	4	14
15-19	32	4.7	5	2.1	27	6.0	29	4.5	4	1.8	25	5.9	3	1	2
20-24	12	1.7	1	.4	11	2.5	10	1.5	1	.4	9	2.1	2	0	2
25-29	4	.6	1	.4	3	.7	3	.5	1	.4	2	.5	1	0	1
30 and over	4	.6	0	0	4	.9	4	.7	0	0	4	.9	0	0	0
Age unknown	1	----	0	----	1	----	1	----	0	----	1	----	----	----	----
Total	687	100	238	100	449	100	647	100	225	100	422	100	40	13	27
Percentage of total	----	100	----	34.7	----	65.3	----	94.2	----	32.8	----	61.4	5.8	1.9	3.9
Mean age	10.5	----	9.6	----	10.9	----	10.4	----	9.7	----	10.8	----	11.4	9.3	12.4
Median age	10.1	----	9.3	----	10.6	----	10.0	----	9.3	----	10.5	----	11.1	8.9	12.0

Unlike rheumatic fever, in which only 46.2 percent of admissions occurred among persons under 15 years of age (table 3), 92.4 percent of admissions for chorea were indicated during this age period. For practical purposes, admissions for chorea were largely confined to the 5–14-year age period, in which 89.8 percent occurred. Only 2.6 percent were among persons under 5 years, while only 7.6 percent occurred among persons older than 15 years.

This age distribution is in substantial agreement with a number of studies, except for the possibility that years ago slightly more cases occurred among persons over 15 years of age. Osler (*42*) noted that over three-fourths of 522 cases occurred during the second and third 5-year age periods. Stephen Mackenzie (*40*) reported that only 20.7

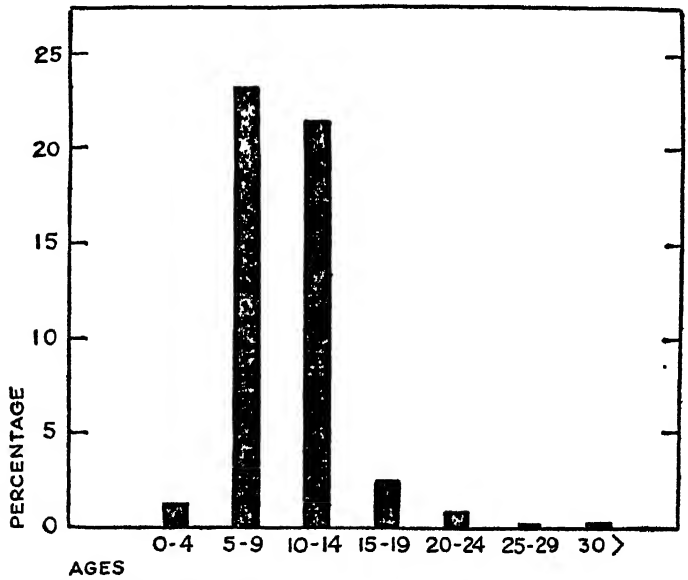

FIGURE 5.—Percentage distribution by 5-year age periods of 687 cases of Sydenham's chorea, with or without rheumatic heart disease, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during period under study.

percent of 439 cases were among persons over 16 years. In Thayer's (*43*) series of 808 cases, 84.5 percent occurred between the ages of 5 and 15. There is also general agreement that chorea is infrequent under the age of 5.

With the possible exception of similar reports among foreign armies, the report by Love and Davenport (*56*) on physical defects among drafted men in the United States during the World War is the only source suggesting any great degree of frequency of chorea among adults. The schedules of this voluminous work contain 593 cases diagnosed as chorea. These authors regard chorea as a generic term including Sydenham's chorea, Huntington's chorea, and probably certain forms

of sclerosis of the spinal tract. While they do not mention it, there is also the possibility that during wartime exigencies, encephalitis following the influenza epidemic was sometimes mistaken for chorea.

Most well-authenticated instances of chorea in adults are associated with pregnancy. These are comparatively rare. In 1932, Willson and Preece (*57*) were able to collect only 951 cases of chorea gravidarum. They found that women attacked are predominantly in the youngest age group of sexual maturity and are mostly primaparae; more than half gave histories of a previous attack. Only two cases of chorea gravidarum were encountered in the present study.

Because of the common observation that Sydenham's chorea occurs with such great frequency during the decade before puberty and generally disappears at puberty regardless of treatment, Gerstley and his associates (*50*) suggest that it is due in part to an endocrine factor. This possibility is rendered more likely since almost the only time it is seen in adults is during pregnancy.

According to table 8, the greatest frequency of admissions among males was during the 5–9-year age period, and among females during the 10–14-year age period. A smaller percentage of admissions was noted among males than females over age 15. This further suggests the possibility of an endocrine factor. So few cases were met with among colored persons that it is not possible to make a comparative study of the age distribution.

Nearly twice as many cases occurred among females as among males. Nearly every investigator of this disease has commented upon the greater frequency in girls; in most studies the proportion is between 2 and 3 to 1. The percentage of cases with and without heart disease was practically the same in each sex.

Only 5.8 percent of 687 cases of chorea were among Negroes. According to the United States Census of 1930, 11.3 percent of the population of Philadelphia was colored. Owing to their less favorable economic status, colored persons are more likely to be hospitalized. At the present time, for example, Negroes comprise about 45 percent of all admissions to the Philadelphia General Hospital; this percentage was probably somewhat smaller during 1930–34. It appears, therefore, that Sydenham's chorea is distinctly less common among Negroes. It is noteworthy that among the 398 cases of simple Sydenham's chorea without heart disease only 3.5 percent were in Negroes, while among 289 cases of chorea with heart disease 9 percent were in Negroes. This suggests that chorea among Negroes is more likely to be attended by cardiac involvement.

Nearly 60 years ago S. Weir Mitchell (*58*), of Philadelphia, concluded on the basis of personal observations and a questionnaire study among physicians in the South, that Sydenham's chorea was relatively rare among Negroes. Thayer (*43*) found only 3 percent of

808 cases at the Johns Hopkins Hospital among colored persons, although the proportion of Negroes treated for all conditions amounted to about 12 percent. Osler (*42*) considered chorea rare among Negroes. Not long ago Lueth and Sutton (*59*) expressed doubt concerning its relative infrequency among Negroes, and pointed out that 9 of 58 cases which they had seen in Chicago were among Negroes. The present study suggests that although chorea is apparently distinctly less common among Negroes it should not be regarded as a rare disease.

According to table 9 the age distribution, mean, and median ages of chorea with and without rheumatic heart disease are quite similar. A slightly greater percentage of chorea with heart disease was noted in the 5–9-year age period. In neither group were many admissions indicated among persons over 15 years of age.

TABLE 9.—*Age distribution by 5-year periods of 687 cases of Sydenham's chorea, 289 of which were diagnosed as having rheumatic heart disease and 398 diagnosed as not having rheumatic heart disease, in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during the period under study. Also percentage of cases of chorea with rheumatic heart disease in each age period*

Age (years)	All Sydenham's chorea		Chorea with heart disease		Chorea without heart disease		Percentage with heart disease
	Number	Percent	Number	Percent	Number	Percent	
Under 5	18	2.6	3	1.0	15	3.8	16.7
5–9	319	46.5	141	48.8	178	44.8	44.2
10–14	297	43.3	122	42.2	175	44.1	41.1
15–19	32	4.7	15	5.2	17	4.3	46.9
20 and over	20	2.9	8	2.8	12	3.0	40.0
Age unknown	1		0		1		0
Total	687	100	289	100	398	100	42.1
Mean age	10.5		10.5		10.6		
Median age	10.1		10.0		10.2		

Percentage of Sydenham's chorea with rheumatic heart disease.—Rheumatic heart disease was diagnosed in 42.1 percent of 687 cases of Sydenham's chorea admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934 (table 9). Rheumatic heart disease was indicated in 63.3 percent of 1,324 cases of rheumatic fever (table 4). No attempt was made to subdivide chorea into "pure" and "mixed" types. During the 5–9-year age period, rheumatic heart disease was diagnosed in 44.2 percent of chorea, as compared with 41.1 percent in the 10–14-year age period, an almost equal distribution. The percentage of heart disease among these 687 cases is nearly the same as that shown in table 7, which indicates that 46.5 percent of 4,616 cases collected in the literature were reported as exhibiting clinical evidence of rheumatic heart disease.

Age of onset of Sydenham's chorea.—The clinical records of 954 patients indicated a history of Sydenham's chorea; in 650 instances the first attack occurred during an admission under study, while in

304 instances the first attack occurred prior to the beginning of this study. The age distribution by sex and color of 920 cases in which the age at onset was recorded is shown in table 10. The percentage of cases in each race and sex group is approximately the same as that shown in table 8. Females predominate; comparatively few histories of chorea were obtained from Negroes.

Table 10 and figure 6 illustrate to an even greater extent than table 8 and figure 5 that the age distribution of chorea is limited for the most part to persons under 15 years of age. According to table 10, only 5.5 percent of chorea developed among persons over 15 years of age; only 2.2 percent occurred among males, and 7.0 percent among females.

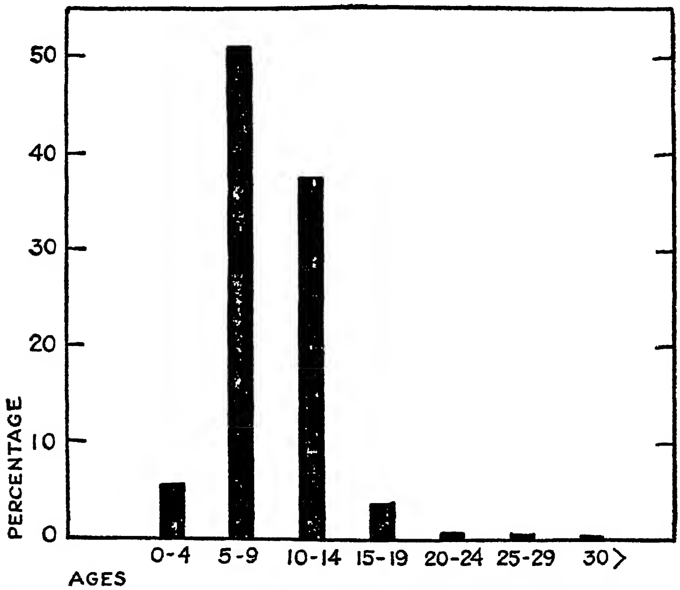

FIGURE 6.—Percentage distribution by 5-year age periods of 920 first attacks of Sydenham's chorea, with or without rheumatic heart disease, based on present or past history, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

The mean age at onset was 9.3 years, 8.6 among males, 9.7 among females. The mean age at onset among white persons was 9.3 years, among colored persons 10.3 years. The median and modal ages at onset are in close agreement with the mean.

Interrelation of chorea and rheumatic fever.—In only 41 instances were diagnoses made of rheumatic fever and Sydenham's chorea during a single admission. The fact that in only 6 percent of 687 cases of chorea was rheumatic fever found and in only 3.1 percent of 1,324 cases of rheumatic fever was chorea present during the same admission suggests the infrequency with which these diseases occur simultaneously. It is doubtful if many of these patients had both of these

conditions concurrently, since many admissions for rheumatic conditions are of several months' duration.

TABLE 10.—*Distribution by 5-year age periods, according to color and sex, of the age at onset of 920 attacks of Sydenham's chorea, with or without rheumatic heart disease, among current admissions and according to the previous histories of patients admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age (years)	Total						White						Colored			
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male (number)	Female (number)
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent		
Under 5	53	5.8	18	5.7	35	5.8	50	5.8	17	5.7	33	5.8	3	5.9	1	2
5-9	471	51.2	184	58 6	287	47.4	450	51 8	174	58.6	276	48 2	21	41.2	10	11
10-14	346	37.6	105	33 4	241	39.8	324	37.8	100	33 7	224	39.2	22	43.1	5	17
15-19	34	3.7	5	1 6	29	4.8	30	3.5	4	1.3	26	4.5	4	7.8	1	3
20 and over	16	1.8	2	.6	14	2.2	15	1.7	2	.6	13	2.3	1	2 0	0	1
Total	920	100	314	100	606	100	869	100	297	100	572	100	51	100	17	34
Percentage of total	-----	-----	-----	34.1	-----	65.9	-----	94.5	-----	32.3	-----	62.2	-----	5.5	1.8	3.7
Mean age	9 3	-----	8.6	-----	9.7	-----	9.8	-----	8.6	-----	9.6	-----	10 2	-----	8.5	11.0
Median age	9.8	-----	8.8	-----	9.7	-----	9.3	-----	8.8	-----	9.6	-----	10.3	-----	8.8	11.2
Modal age	9.8	-----	9.3	-----	9.4	-----	9.3	-----	9.3	-----	9.4	-----	10.8	-----	9.2	11.1

Histories of previous chorea were recorded in 3.9 percent of 1,324 cases of rheumatic fever—in 5.1 percent of 838 cases with heart disease and in 1.9 percent of 486 cases without heart disease. Histories of previous chorea were mentioned in 10.6 percent of 687 cases of chorea—in 18.7 percent of 289 cases of chorea with heart disease and in 4.8 percent of 398 cases of simple Sydenham's chorea. These figures are in general agreement with the findings of Sturges (*41*), Osler (*42*), Gerstley and his associates (*50*), Stephen Mackenzie (*40*), Koplik (*47*), Starr (*60*), Abt and Levinson (*45*), Thayer (*43*), Strong (*48*), and others. In fact, most of these writers report a higher percentage of previous rheumatic involvement than the present investigation.

Ash (*14*), in a carefully conducted study, observed 153 choreic patients for an average period of 7½ years, and noted that 62.8 percent at some time suffered from articular pains. She stated, "In 15.6 percent the sequence of choreic movements and articular pains was so rapid as to make inevitable the assumption that both were manifestations of a single infection." No statement was made about the antecedent history of these conditions, owing probably to the fact that they were often seen very soon after onset.

In the opinion of the writer the rather low percentage of cases of chorea giving a history of previous rheumatic fever, and vice versa, does not necessarily militate against the view that both of these diseases are manifestations of the same underlying condition. A higher degree of association would doubtless have been found were these

cases followed for a number of years. A previous history of rheumatic fever is infrequent in Sydenham's chorea, especially without heart disease. About 15 percent of cases of rheumatic heart disease have had chorea, and about 40 percent of chorea cases exhibit unmistakable signs of rheumatic heart disease. Since the pathological picture of rheumatic heart disease in which chorea is the first or only manifestation other than cardiac involvement is the same as when rheumatic fever is the primary manifestation, it is not unreasonable to affirm the belief that both of these conditions are of rheumatic origin.

RHEUMATIC HEART DISEASE

Review of literature on history of rheumatic fever and Sydenham's chorea among cases of rheumatic heart disease.—Table 11 shows the percentage of cases of rheumatic heart disease with histories of rheumatic fever, Sydenham's chorea, or both of these conditions. In a measure, any table of this sort is only relatively accurate because of the failure of patients to remember rheumatic episodes. This applies especially to cases of rheumatic heart disease first seen in adult life. Ash (*14*), dealing only with cases followed since childhood, comments: "It is of interest that though many of these children were observed during a period when articular pain existed, often with objective evidence of swelling and tenderness, a large percentage, even within a few years of their illness, had no memory of such pains. One can readily understand the difficulty of obtaining a history of rheumatism when heart disease is first detected in adult life." Even the parents of rheumatic children often fail to recall frank attacks of rheumatic polyarthritis after a few years.

In addition to the writers (table 11) who have determined the percentage of cases of rheumatic heart disease with a history of rheumatic arthritis and chorea, a number of investigators including Kaiser (*12*), Coburn (*65*), Paul (*66*), Christie (*67*), Hart, Wood, and Daughton (*68*), and many others have indicated the importance of the role of rheumatic fever in rheumatic infection as a whole, not specifying heart disease. White (*69*) states that a history of rheumatic fever, mild or severe, can be found in about 70 percent of cases of rheumatic heart disease, and in another 5 to 10 percent a history of chorea without rheumatism is obtainable. Coombs (*6*) places the history of rheumatic arthritis at 75 percent.

TABLE 11.—*Review of literature showing percentage of rheumatic heart disease with histories of rheumatic fever and Sydenham's chorea*

Number of cases of rheumatic heart disease	Percentage with history of rheumatic fever	Percentage with history of chorea	Percentage with rheumatic fever and chorea	Source	Location	Type of patients	Author	Year	References
60			61.7	Personal observations	Bristol, England	Adults	Coombs	1924	*(6)*
459			86.7	Royal Hospital for Sick Children	Glasgow, Scotland	Children	Findlay	1931	*(10)*
258	68	28		Children's Hospital	Birmingham, Ala.	do	McLean	1932	*(61)*
148	50.7	4.1	10.8	Peter Bent Brigham Hospital	Boston	Adults and children	Laws and Levine	1933	*(62)*
208	68	4.3		Louisville City Hospital	Louisville	do	Simmons	1934	*(63)*
224	44.4			Baylor and Parkland Hospital	Dallas	do	Winans and Dunstan	1935	*(64)*
445	[1] 57.7	[1] 21.3		Children's Hospital	Philadelphia	Children	Ash	1936	*(14)*
688			62.6	Mt. Sinai Hospital	New York	do	Roth, Lingg, and Whittemore.	1937	*(17)*

[1] Primary manifestations.

Age, race, and sex of 3,654 cases of rheumatic heart disease.—The age, race, and sex distribution of 3,654 cases of rheumatic heart disease, including 209 cases of subacute bacterial endocarditis superimposed on rheumatic heart disease (table 1) is shown in table 12. This table and figure 7 indicate that despite the fact that rheumatic heart disease at all ages is included in this study, it is still predominantly a problem of youth and early adult life. Only 2.7 percent of admissions were indicated among persons under 5 years of age. This is in agreement with the common observation that rheumatic fever is relatively infrequent in children under 5 years. The greatest occurrence, 17.5 percent, is indicated in the 5–9-year age group, although nearly as many, 17.1 percent, were admitted during the age period 10–14 years. During the 15–19-year age period, 10.5 percent were admitted. Al-

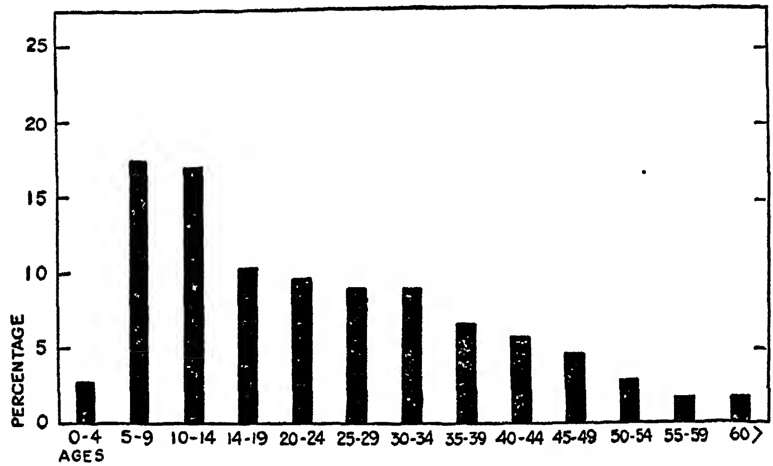

FIGURE 7.—Percentage distribution by 5-year age periods of 3,654 cases of rheumatic heart disease, based on age at initial admission during period under study, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

together, nearly half of the admissions (47.8 percent) occurred among persons under 20 years of age. After that age the percentage of admissions was progressively smaller, except during the 25–29 and 30–34-year age periods in each of which 9.1 percent of admissions occurred. Only 17.3 percent of admissions involving rheumatic heart disease were among persons over 40, and only 1.9 percent among persons over 60 years of age. These figures are a clear indication of the fact that rheumatic heart disease is not a problem of the aged, but rather of youth and early adult life.

In contradistinction to rheumatic fever, in which the distribution of initial admissions during the period under study was approximately equal on the basis of sex (table 3), 58.6 percent of rheumatic heart disease occurred among females and only 41.4 percent among

males. This is in agreement with the concensus of most investigators that rheumatic heart disease is somewhat more common among females. A greater number among females was indicated in every age period except 15–19 years in which it was about equally distributed. Except for a slightly greater percentage of males under 20 years the age distribution was essentially the same. The peak of occurrence among males was in the 5–9-year age group, among females in the 10–14-year period.

Only 13.3 percent occurred among colored persons. Although this is in proportion to the size of the colored population of Philadelphia, it suggests that rheumatic heart disease is less common than among white persons. Owing to their less favorable economic circumstances Negroes are more likely to be hospitalized. Nearly 50 percent of the colored population is on relief; the remainder are, for the most part, unable to provide medical treatment for a protracted and catastrophic illness such as rheumatic heart disease.

The age distribution of the colored population may account in part for the lower frequency, even among hospital patients. During the decade between 1920 and 1930 the colored population of Philadelphia increased 69 percent, owing largely to the migration of young adults from the South. Most of these persons are not now in the age period in which rheumatic heart disease is most common. Furthermore, it is not unlikely that there was less migration among persons with serious handicaps, as most of them came North seeking employment. Offsetting this possibility is the fact that the age distribution of rheumatic heart disease in hospitals was in comparable agreement with the age distribution among white persons. Among both colored males and females the greatest occurrence was noted during the 10–14-year age period.

The mean age of initial admissions during the period under study was 24.2 years, lower by more than 5 years than the mean age at death. The mean ages were approximately the same in each race and sex group. The median age was 21.1 years, and was slightly higher among females than males. The mode was 9.3 years—9.3 among males and 11.8 among females. The modal age was slightly lower among white persons than Negroes.

Table 12.—*Age distribution, in 5-year groups, according to race and sex of 3,654 cases of rheumatic heart disease admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during the period under study*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	99	2.7	46	3.1	53	2.5	88	2.8	42	3.2	46	2.5	11	2.3	4	2.1	7	2.4
5-9	637	17.5	298	19.8	339	15.9	595	17.9	268	20.5	297	16.1	72	14.9	30	15.4	42	14.6
10-14	624	17.1	265	17.6	359	16.8	528	16.7	221	16.9	307	16.6	96	19.9	44	22.6	52	18.1
15-19	383	10.5	193	12.8	190	8.9	336	10.6	173	13.2	163	8.8	47	9.7	20	10.3	27	9.4
20-24	357	9.8	127	8.4	230	10.8	299	9.5	105	8.0	194	10.5	58	12.0	22	11.3	36	12.5
25-29	331	9.1	121	8.0	210	9.8	280	8.9	103	7.9	177	9.6	51	10.6	18	9.2	33	11.5
30-34	333	9.1	125	8.3	208	9.7	279	8.8	104	7.9	175	9.5	54	11.2	21	10.8	33	11.5
35-39	249	6.8	86	5.7	163	7.6	227	7.2	78	6.0	149	8.1	22	4.6	8	4.1	14	4.9
40-44	216	5.9	71	4.7	145	6.8	192	6.1	64	4.9	128	6.9	24	5.0	7	3.6	17	5.9
45-49	171	4.7	74	4.9	97	4.5	150	4.7	65	5.0	85	4.6	21	4.3	9	4.6	12	4.2
50-54	108	3.0	39	2.6	69	3.2	96	3.0	34	2.6	62	3.4	12	2.5	5	2.6	7	2.4
55-59	65	1.8	28	1.9	37	1.7	58	1.8	26	2.0	32	1.7	7	1.4	2	1.0	5	1.7
60 and over	68	1.9	32	2.1	36	1.7	60	1.9	27	2.1	33	1.8	8	1.7	5	2.6	3	1.0
Unknown	13		6		7		12		5		7		1		1		0	
Total	3,654	100	1,511	100	2,143	100	3,170	100	1,316	100	1,855	100	481	100	196	100	288	100
Percentage of total				41.4		58.6		86.7		36.0		50.7		13.3		5.4		7.9
Mean age	24.2		23.2		24.9		24.3		23.1		25.1		23.7		23.3		24.0	
Median age	21.1		18.7		22.8		21.0		18.6		22.9		21.3		19.9		22.2	
Modal age	9.3		9.3		11.8		9.3		9.2		11.8		12.0		12.0		12.0	

Age distribution, according to race and sex, at onset of 2,195 cases of rheumatic heart disease.—The age at onset was recorded in the clinical histories of 2,195 of 3,654 cases. These included 616 instances in which onset of rheumatic heart disease occurred about the time of the initial admission in the period under study, and 1,579 in which an onset at an earlier age was indicated.

According to table 13 and figure 8, 6.6 percent admitted onset of rheumatic heart disease under 5 years of age. The peak occurrence of onset, 27.7 percent, was indicated in the 5–9-year age period. Nearly as many, 23.5 percent, began during the 10–14-year age period. Onset of rheumatic heart disease was indicated in 11.3 percent of cases during the 15–19-year age period. A progressively smaller

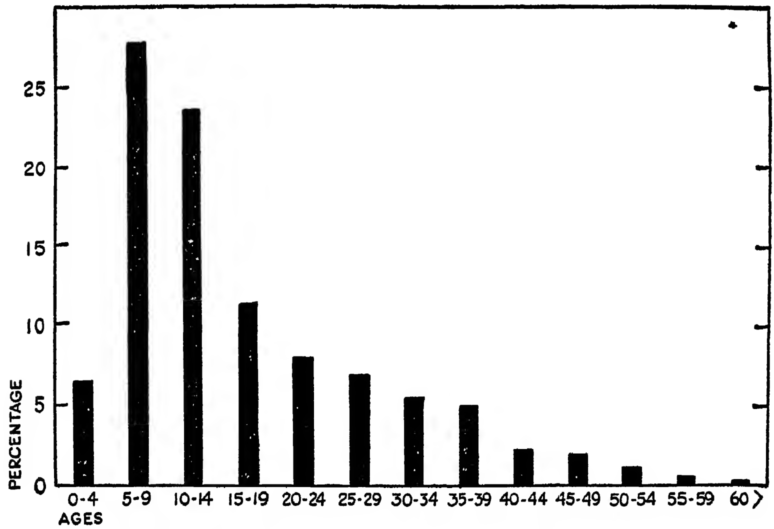

FIGURE 8.—Percentage distribution by 5-year age periods of onset of 2,195 cases of rheumatic heart disease, based on present or past histories, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

percentage for onset of rheumatic heart disease was noted in each subsequent 5-year period.

With the exception that a slightly greater percentage of males than females and of white persons than Negroes developed rheumatic heart disease prior to age 20, the age distribution was essentially similar in each race and sex group. The mean age at onset was 16.0 years, the median age was 13.3 years, and the modal 8.9 years. Only slight differences are noted on the basis of color and sex. These figures are in close agreement with the mean, median, and modal ages of 2,539 first attacks of rheumatic fever (table 5).

TABLE 13.—*Age distribution by 5-year groups, according to race and sex, at onset of heart disease of 2,195 cases of rheumatic heart disease according to history of patient among 3,654 cases of rheumatic heart disease admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	144	6.6	64	6.7	80	6.5	129	6.8	56	6.7	73	6.8	15	5.2	8	6.3	7	4.3
5-9	609	27.7	283	29.5	326	26.4	535	28.1	252	30.3	283	26.4	74	25.5	31	24.6	43	26.2
10-14	515	23.5	235	24.5	280	22.6	456	23.9	211	25.4	245	22.8	59	20.3	24	19.0	35	21.3
15-19	247	11.3	120	12.5	127	10.3	209	11.0	98	11.8	111	10.3	38	13.1	22	17.5	16	9.8
20-24	176	8.0	54	5.6	122	9.9	150	7.9	43	5.2	107	10.0	26	9.0	11	8.7	15	9.1
25-29	151	6.9	62	6.5	89	7.2	126	6.6	54	6.5	72	6.7	25	8.6	8	6.3	17	10.4
30-34	120	5.5	52	5.4	68	5.5	97	5.1	42	5.0	55	5.1	23	7.9	10	7.9	13	7.9
35-39	107	4.9	30	3.1	77	6.2	95	5.0	26	3.1	69	6.4	12	4.1	4	3.2	8	4.9
40-44	49	2.2	22	2.3	27	2.2	41	2.2	18	2.2	23	2.1	8	2.8	4	3.2	4	2.4
45-49	41	1.9	20	2.1	21	1.7	35	1.8	18	2.2	17	1.6	6	2.1	2	1.6	4	2.4
50-54	24	1.1	10	1.0	14	1.1	21	1.1	9	1.1	12	1.1	3	1.0	1	.8	2	1.2
55-59	9	.4	4	.4	5	.4	9	.5	4	.5	5	.5	0	0	0	0	0	0
60 and over	3	.1	2	.2	1	.1	2	.1	1	.1	1	.1	1	.3	1	.8	0	0
Total	2,195	100	958	100	1,237	100	1,905	100	832	100	1,073	100	290	100	126	100	164	100
Percentage of total				43.6		56.4		86.8		37.9		48.9		13.2		5.7		7.5
Mean age	16.0		16.0		17.1		16.4		15.8		17.0		17.6		17.3		17.8	
Median age	13.3		12.8		13.8		13.2		12.6		13.7		14.7		15.0		14.6	
Modal age	8.9		8.9		8.9		8.9		9.0		8.9		9.0		8.8		9.2	

Cumulative percentage of age at onset of rheumatic heart disease.—Onset prior to age 5 was indicated in 6.6 percent of 2,195 cases of rheumatic heart disease (fig. 9 and table 13). In over a third (34.3 percent) the onset of rheumatic heart disease occurred before age 10, in well over a half (57.8 percent) prior to age 15, in over two-thirds (69.1 percent) prior to age 20, in over three-fourths (77.1 percent) prior to age 25, in 84 percent prior to age 30, in nearly 90 percent before age 35, and in nearly 95 percent among persons younger than 40 years. The clinical inception of only 5.7 percent of rheumatic heart disease developed in persons past 40.

This is probably an understatement of the actual cumulative percentage of the onset of rheumatic heart disease in childhood, youth, early and middle adult life. Rheumatic heart disease often develops

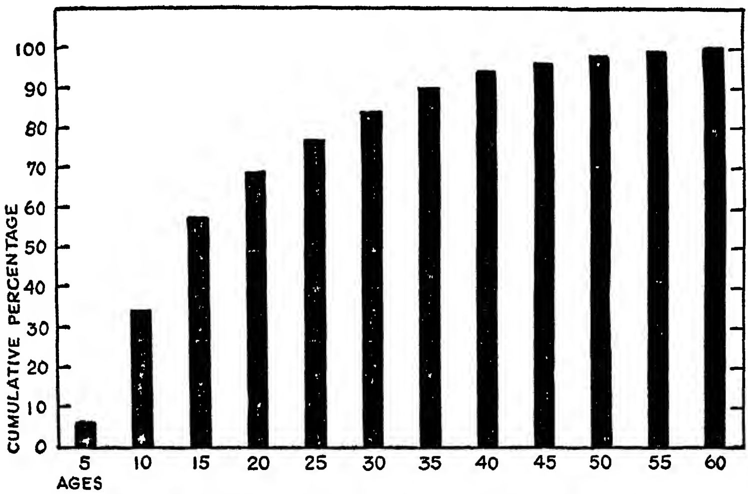

FIGURE 9.—Cumulative percentage by 5-year periods of onset of 2,195 cases of rheumatic heart disease, based on past or present histories, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

years before the patient is cognizant of its existence. It usually begins with an attack of rheumatic fever or chorea during childhood. It may, however, be initiated during a recurrence of these conditions, or during a recurrence or exacerbation of rheumatic infection unattended by choreiform or arthritic manifestations. Sometimes it apparently begins insidiously following an attack of these diseases. It may also develop insidiously in persons who have never exhibited clinical manifestations of rheumatic fever or chorea. Sometimes the onset of rheumatic heart disease actually antedates attacks of these conditions. Not infrequently rheumatic heart disease is first detected in an apparently healthy individual during a physical examination for life insurance, employment, or military service. In other instances

rheumatic heart disease is not recognized until it becomes a severe handicap, or is even incapacitating.

Percentage of rheumatic heart disease with history of rheumatic fever or Sydenham's chorea.—Of the 3,654 cases of rheumatic heart disease, 2,248, or 61.5 percent, gave a previous history of rheumatic fever or had clinical manifestations during an admission under study. Similarly, evidence of chorea was obtained in 556 cases, or 15.2 percent. Of these 556 cases with a previous or current history of chorea, 138 also had a history of rheumatic fever. Consequently, a history of Sydenham's chorea without rheumatic fever was indicated in 418, or 11.4 percent. A present or previous history of rheumatic fever, Sydenham's chorea, or both of these conditions was indicated in 2,656 instances, or 72.7 percent. This percentage is in reasonable accord with the findings of a number of writers, as shown in table 11.

Percentage of rheumatic fever among admissions involving rheumatic heart disease.—Clinical manifestations of rheumatic fever were exhibited among 838 of 3,654 initial admissions involving rheumatic heart disease during the period under study. According to table 14, the percentage of rheumatic fever among cases of rheumatic heart disease tends to become less with advancing years. Among the cases under age 20, 31.7 percent had rheumatic fever. The greatest percentage was indicated in children under 5 years of age, 43.4 percent of these cases of rheumatic heart disease being diagnosed as having rheumatic fever. This is only to be expected since most cases admitted during that age period are for severe primary manifestations, or recrudescences or recurrences of rheumatic infection, often with signs of rheumatism. With each succeeding 5-year period more patients are probably admitted for conditions caused by the cumulative effects of long-standing rheumatic heart disease.

TABLE 14.—*Age distribution, by 5-year groups, of rheumatic fever among 3,654 cases of rheumatic heart disease admitted to Philadelphia hospitals January 1, 1930, to December 31, 1934*

Age (years)	Total rheumatic heart disease	Rheumatic heart disease with rheumatic fever	Percent with rheumatic fever	Age (years)	Total rheumatic heart disease	Rheumatic heart disease with rheumatic fever	Percent with rheumatic fever
Under 5	99	43	43.4	40–44	210	26	12.0
5–9	637	190	29.8	45–49	171	14	8.2
10–14	624	193	30.9	50–54	108	12	11.1
15–19	383	126	32.9	55–59	65	2	3.1
20–24	357	88	24.6	60 and over	68	3	4.4
25–29	331	67	20.2	Unknown	13	2	15.4
30–34	333	52	15.6				
35–39	249	20	8.0	Total	3,654	838	22.9

Estimated percentage of rheumatic activity according to 5-year age periods.—Efforts were made to estimate the percentage of cases of active rheumatic infection in each age period among 3,446 cases of rheumatic heart disease uncomplicated by subacute bacterial endocarditis. The relation of rheumatic activity to subacute bacterial endocarditis is a moot question, and is often impossible to determine in clinical cases, much less in a review of hospital records.

Fortunately, a number of hospitals in Philadelphia use the American Heart Association nomenclature (*23*), which provides for the diagnosis of active and inactive rheumatic heart disease. In other instances it was necessary to review the clinical records for evidence of rheumatic activity. All cases of rheumatic heart disease associated with rheumatic fever or chorea were considered as manifesting signs of

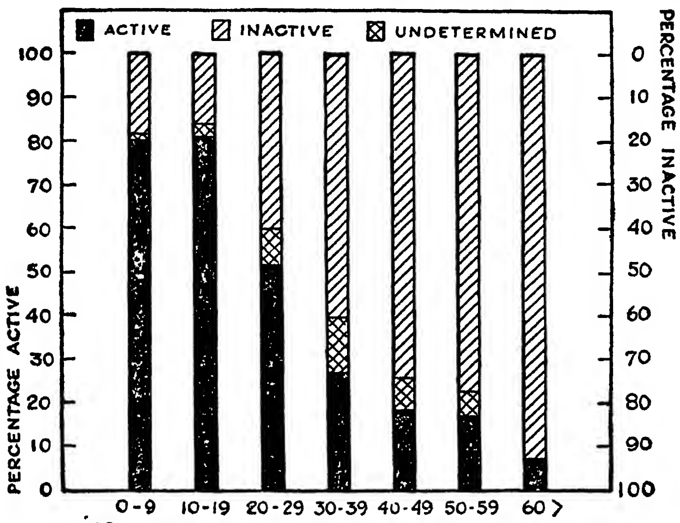

FIGURE 10.—Percentage of 3,446 cases of rheumatic heart disease, exclusive of subacute bacterial endocarditis, by age decades, regarded as having signs of activity of rheumatic infection among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

active rheumatic infection. Most cases admitted in close sequence to an attack of rheumatic fever or chorea, and which exhibited clinical and laborato- signs of infection such as fever, leucocytosis, increased sedimentation rates, epistaxis, and other signs of infection, were regarded as manifesting signs of active rheumatic infection. Cases without a recent history of rheumatic fever or chorea with signs of infection, not otherwise accounted for, were regarded as having rheumatic activity.

Of these 3,446 cases of rheumatic heart disease (fig. 10) uncomplicated by subacute bacterial endocarditis, 56.4 percent were regarded as showing signs of rheumatic infection. Excluding a relatively

small number of cases in which no estimate of activity of rheumatic infection was made, 59.3 percent were considered as having evidence of rheumatic activity.

Over 80 percent of cases under age 20 were regarded as having active rheumatic heart disease. This is probably no greater because a number of admissions to general and children's hospitals were made prior to transfer to the Children's Heart Hospital, which requires a 2 weeks' period of observation to prevent the introduction of communicable diseases and to obtain certain laboratory studies. Many of these patients do not exhibit signs of rheumatic activity during their short stay in a general hospital and are admitted to the Children's Heart Hospital because they have had a rheumatic episode in the recent past, are underweight, or because of poor home conditions.

In persons over 20 years of age, a lower percentage of rheumatic activity was noted in each succeeding age decade. Only 7.2 percent of cases over 60 years were regarded as demonstrating signs of activity of rheumatic infection.

Rheumatic heart disease in pregnancy.—One hundred and sixteen cases of rheumatic heart disease among pregnant women were recorded. These involved 129 admissions. Based on the age at the initial admission during the period under study, the following age distribution was indicated:

Age (years)	*Number*	*Percentage*
15-19	11	9. 5
20-24	33	28. 4
25-29	32	27. 6
30-34	18	15. 5
35-39	16	13 8
40-44	6	5. 2
Total	116	100. 0

The mean age was 28.2 years.

One hundred and six of the women were white and 10 were colored. Twenty had Caesarian sections, 11 therapeutic abortions, 2 simple sterilization operations, 6 threatened or inevitable abortions, 3 toxemias of pregnancy, 10 had a number of miscellaneous complications, 7 were discharged before delivery, and 57 apparently had entirely normal deliveries. Twenty-one died during pregnancy or the puerperium. The causes of these deaths will be studied in detail in the third of this series of articles, which consists of an analysis of fatal cases of rheumatic heart disease in Philadelphia hospitals during 1930-34.

SUBACUTE BACTERIAL ENDOCARDITIS

Review of the literature on the relationship of rheumatic fever and rheumatic heart disease to subacute bacterial endocarditis.—The percentage

of subacute bacterial endocarditis with a history of rheumatic fever and Sydenham's chorea, and the percentage exhibiting clinical or necropsy manifestations of rheumatic heart disease, based on a number of investigations, is shown in table 15. Most of the clinical diagnoses of antecedent rheumatic cardiac involvement are based on a history of pre-existing valvular disease of the rheumatic type, usually acquired during childhood or youth. Several of these writers comment upon the difficulties attending diagnosis, solely on the basis of physical findings, of subacute bacterial endocarditis superimposed on rheumatic heart disease. With the exception of the study by Horder (*72*), which is reasonably comparable, all are made on diagnoses of subacute bacterial endocarditis. Horder, who uses the designation "infective endocarditis," made his study in 1908 before the term "subacute bacterial endocarditis" came into common usage to describe what is now a well-recognized clinical entity.

Of the 310 cases of subacute bacterial endocarditis in this collected series studied post mortem in which an inquiry was made about antecedent rheumatic infection, a positive history of rheumatic fever or chorea was obtained in 50.9 percent. Of 472 cases examined post mortem, 62.1 percent exhibited lesions which were considered characteristic of rheumatic heart disease. A history of rheumatic fever or chorea was obtained in 51.9 percent of 770 cases of subacute bacterial endocarditis in which a clinical diagnosis was made, while 63.8 percent were regarded as having a pre-existing rheumatic cardiac lesion.

Percentage of subacute bacterial endocarditis with rheumatic basis.— Of the 324 cases of subacute bacterial endocarditis (table 1) 209, or 64.5 percent, were considered as having a rheumatic basis, while 115, or 35.5 percent, were either superimposed on other types of heart disease or were apparently instances of "primary" subacute bacterial endocarditis. This indicates that subacute bacterial endocarditis is predominantly a complication of rheumatic heart disease; measures to reduce the incidence of rheumatic fever would doubtless be reflected in a reduction of this almost invariably fatal disease.

Of the 209 cases of subactute bacterial endocarditis apparently engrafted on rheumatic heart disease, necropsies were obtained in 81 instances. Among the cases examined post mortem a previous history of rheumatic fever or chorea was indicated in 55, or 67.9 percent. There were only 3 with histories of chorea, all of which also gave a history of rheumatic fever. In 5 instances there was a history of acquired heart disease dating back many years. In 21 cases, or 25.9 percent, a rheumatic implication was made solely on the basis of necropsy findings.

TABLE 15.—*Percentage of subacute bacterial endocarditis indicated by a number of writers as having a history of rheumatic fever or chorea, or signs of pre-existing rheumatic heart disease*

Designation	Number of cases	Percentage with history of rheumatic fever or chorea	Percentage with signs of rheumatic heart disease	Basis of diagnosis	Author	Source	Location	Reference
Subacute bacterial endocarditis	37	51	60	Necropsy	Brink and Smith	Mayo Clinic	Rochester, Minn.	(70)
Do	47		74	do	Davis and Weiss	Boston City Hospital	Boston	(71)
Infective endocarditis	114		80	do	Horder	Several sources	London	(72)
Do	150	48		Clinical	do	do	do	(72)
Subacute bacterial endocarditis	26		81	Necropsy	Thayer	Johns Hopkins Hospital	Baltimore	(73)
Do	25	60		do	do	do	do	(73)
Do	150	45	38	do	Blumer	Personal observations and literature.		(74)
Do	330	50		Clinical	do	do		(74)
Do	111		45	do	Fulton and Levine	Peter Bent Brigham Hospital	Boston	(75)
Do	145	Over 50		do	Morrison	Massachusetts General Hospital	do	(76)
Do	72	50	57	Necropsy	Clawson	University of Minnesota	Minneapolis	(77)
Do	20	79	100	do	Van Glahn and Pappenheimer.	Presbyterian Columbia Hospital	New York	(78)
Do	115	60	82	Clinical	do	do	do	(78)
Do	30	70		do	Bierring	Personal observations	Des Moines	(79)

In 128 cases of subacute bacterial endocarditis, the diagnosis of rheumatic involvement was made on the basis of clinical studies. A history of rheumatic fever or chorea, usually years prior to the admission under study, was indicated in 97, or 75.8 percent. Only 7 gave histories of chorea; 4 also had rheumatic fever. In 24 instances, or 18.8 percent, a history of acquired heart disease, apparently of the rheumatic type, was recorded. In 3 others there was a history of scarlet fever, a condition which occasionally results in heart disease of the rheumatic type. In 3 other cases there appeared to be almost indisputable evidence of mitral stenosis, a lesion that is almost always due to rheumatic cardiac involvement. In these cases the condition was regarded by the attending and consulting physicians as having a rheumatic basis.

The diagnoses of 37 of the 115 cases of subacute bacterial endocarditis in which a relationship to rheumatic heart disease was not evident were either made or sustained by post-mortem examinations. In 5 of these 37 cases subacute bacterial endocarditis was engrafted upon a congenital cardiac malformation. There was one apparently proved case of subacute bacterial endocarditis superimposed on syphilitic aortic insufficiency, while in another it was strongly suggested. In the other 30 cases necropsy failed to reveal any definite cardiac abnormality upon which subacute bacterial endocarditis was implanted. Apparently a number were instances of the "primary" or idiopathic type.

It should be borne in mind that, even as a result of post-mortem studies, it is sometimes extremely difficult to detect with reasonable certainty rheumatic involvement of valves which have been almost destroyed or severely distorted because of subacute bacterial endocarditis. This condition is more likely to attack valves slightly impaired from rheumatic involvement than extremely stenosed valves. As a result, it is probable that morbid changes arising from old rheumatic heart disease are frequently not recognized in post-mortem studies of subacute bacterial endocarditis.

In 78 cases of subacute bacterial endocarditis, in which a relationship to rheumatic heart disease was not satisfactorily determined, the diagnosis was made on the basis of clinical studies. In 6 cases congenital malformations apparently served as a nidus for the superimposition of bacterial endocarditis; in 2 instances infective endocarditis was probably engrafted upon lesions of cardiovascular syphilis. In the other 70 no primary focus was determined; in some, however, a rheumatic basis was strongly suggested.

The extreme infrequency of subacute bacterial endocarditis as a complication of syphilitic aortitis, even aortic insufficiency, is in sharp contrast to its frequency as a complication of rheumatic heart disease. This relative rarity has been commented upon by a number of writers

including Cotton (*80*), Martin and Adams (*81*), McMillan and Wilbur (*82*), Briggs (*83*), White (*69*), and others. Martin and Adams reported 157 cases of vegetative endocarditis among 17,000 necropsies at the Los Angeles County Hospital. Of these there were only 5 cases in which vegetative endocarditis was associated with syphilitic aortitis or valvulitis.

Age, race, and sex distribution of subacute bacterial endocarditis.—Of the 324 cases of subacute bacterial endocarditis, 288 are known to have terminated fatally. Of the other 36 cases, 15 were not residents of Philadelphia and could not be followed up. Judging from the clinical records, it is doubtful if any of these 36 cases recovered. The age,

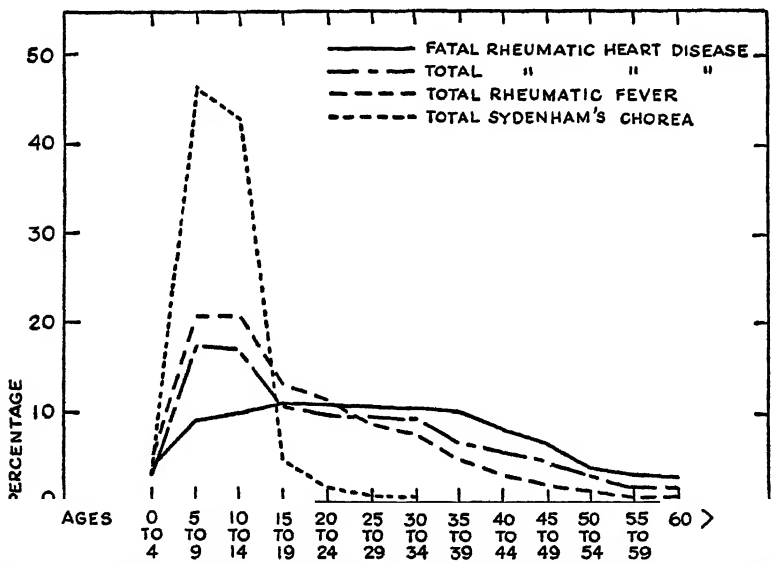

FIGURE 11.—Percentage distribution by 5-year age periods of 687 cases of Sydenham's chorea, 1,324 cases of rheumatic fever, 3,654 cases of rheumatic heart disease, and 916 fatal cases of rheumatic heart disease among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

race, and sex distribution of the 288 fatal cases will be discussed in Part III of this series of articles.

RECAPITULATION OF AGE DISTRIBUTION OF RHEUMATIC CONDITIONS

By way of recapitulation, two figures have been prepared showing the age distribution and cumulative percentage of major rheumatic manifestations.

Figure 11 indicates that Sydenham's chorea is almost exclusively a problem of the 5–14-year age period. Rheumatic fever and rheumatic heart disease have a much wider age distribution but are still predominantly diseases of childhood, adolescence, and early adult life. In both of these conditions the peak occurrence of admissions is in the

5–9-year age period, with nearly as many in the 10–14-year age group. Only a small percentage of admissions occurs after age 50. The age distribution of fatal cases by 5-year periods indicates an almost equal distribution during the 7 hemidecades 5 to 39 years, with a slightly higher percentage in the 15–19-year period. Comparatively few deaths occur after 50 years of age; very few after 60 years.

Figure 12 shows the cumulative percentages of the onset of rheumatic fever, the onset of rheumatic heart disease, admissions for rheumatic heart disease, and fatal rheumatic heart disease. Since the age distribution of chorea is so largely confined to the 5–14-year period, it is not included. This figure indicates at a glance the

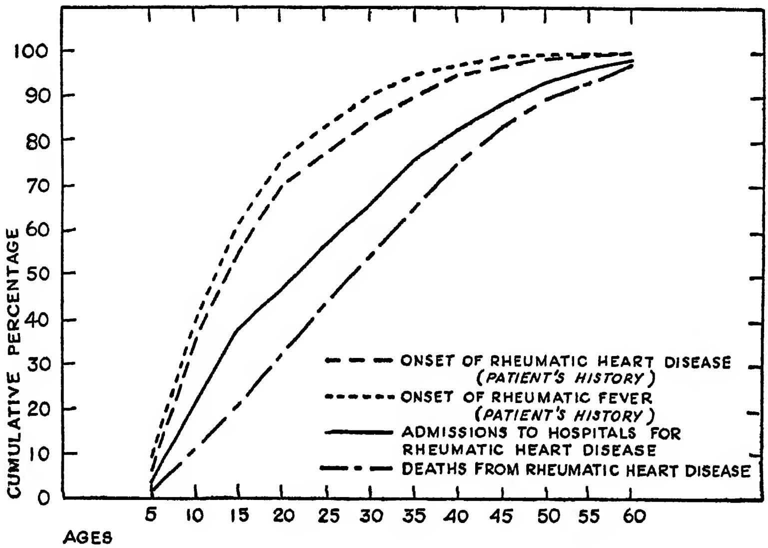

FIGURE 12.—Cumulative percentage by 5-year age periods of onset of 2,539 cases of rheumatic fever, onset of 2,195 cases of rheumatic heart disease, 3,654 cases of rheumatic heart disease (age at admission) and 916 fatal cases of rheumatic heart disease among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

importance of rheumatic conditions as a problem of childhood, youth, and young adult life. To reiterate, the onset of over 75 percent of rheumatic fever and nearly 70 percent of rheumatic heart disease, nearly 50 percent of admissions for rheumatic heart disease, and over 80 percent of deaths from rheumatic heart disease occur before 20 years of age.

SUMMARY

An analysis has been made of the age, race, and sex distribution of rheumatic fever, Sydenham's chorea, and rheumatic heart disease in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the age at initial admission during the period under study and the age at onset as indicated in the clinical histories. In some

cases the onset occurred during stay in hospital; in other instances it was determined by review of patients' past histories. Figures have been prepared showing the age distribution and cumulative percentages by 5-year age periods of a number of important rheumatic manifestations.

The literature has been reviewed and tables prepared showing the association of rheumatic fever and clinical manifestations of rheumatic heart disease, the age at onset of rheumatic infections, the percentage of Sydenham's chorea presenting clinical evidence of rheumatic heart disease, the percentage of rheumatic heart disease with histories of rheumatic fever and Sydenham's chorea, and the percentage of subacute bacterial endocarditis superimposed on rheumatic heart disease.

The importance of rheumatic heart disease as a problem of childhood and youth is emphasized by the fact that the onset of 76.4 percent of rheumatic fever, 98.2 percent of chorea, and 69.1 percent of rheumatic heart disease occurred before age 20. The mode of the age of onset of rheumatic fever was 8.7 years, of Sydenham's chorea 9.3 years, and of rheumatic heart disease 8.9 years. Of the initial admissions during the period under study (not necessarily the first admissions for these conditions), 59.6 percent of rheumatic fever, 97.1 percent of Sydenham's chorea, and 47.8 percent of rheumatic heart disease occurred among persons under 20 years of age Despite the fact that this is the first study on a large scale of the major rheumatic manifestations at all ages, the peak of onset of rheumatic fever, Sydenham's chorea, and rheumatic heart disease occurred in the 5–9-year age period.

The expression "juvenile rheumatism" is regarded as an inappropriate description of a disease which begins for the most part during childhood, but is characterized by chronicity, exacerbations, and recurrences throughout adult life. Although essentially a problem of childhood and youth, attacks of rheumatic fever may occur at almost any age.

In only 2.7 percent of cases of rheumatic fever and 5.7 percent of cases of rheumatic heart disease did the onset occur after age 40. Rheumatic heart disease is decidedly infrequent among hospital patients over 60 years of age. Unlike many other types of heart disease, rheumatic heart disease is not a problem of great importance among persons past middle age.

Rheumatic fever, Sydenham's chorea, and rheumatic heart disease are relatively uncommon under 5 years of age. Very few cases of rheumatic fever under age 2 were admitted, and comparatively few previous histories indicated the onset of rheumatic infection in infancy.

Approximately the same number of males as females were admitted for rheumatic fever; slightly more females than males gave histories

of rheumatic fever. The distribution of rheumatic heart disease according to sex indicated a slightly greater percentage of females. Sydenham's chorea was nearly twice as common among females.

Rheumatic fever and rheumatic heart disease were less common among Negroes than might be expected, considering their unfavorable economic circumstances as a result of which they are more likely to be hospitalized. A considerably greater percentage of first attacks of rheumatic fever was indicated among colored persons in the 20–39-year age period. Sydenham's chorea was relatively uncommon among Negroes. The possibility is suggested that rheumatic heart disease is more likely to develop in association with chorea among colored persons.

The clinical records of 63.3 percent of 1,324 cases of rheumatic fever indicated diagnoses of rheumatic heart disease. The percentage of rheumatic fever with heart disease was greatest among persons under age 20.

Of the 3,654 cases of rheumatic heart disease, 61.5 percent gave histories or exhibited clinical manifestations of rheumatic fever. Sydenham's chorea, with or without rheumatic fever, was indicated in 15.2 percent of rheumatic heart disease. Excluding the cases of chorea which also gave histories or presented clinical evidence of rheumatic fever, 11.4 percent of the cases of rheumatic heart disease gave histories of having had chorea without frank attacks of rheumatic fever. Altogether, 72.7 percent of rheumatic heart disease gave histories or exhibited clinical manifestations of rheumatic fever, Sydenham's chorea, or both of these conditions.

Diagnoses of rheumatic heart disease were indicated in 42.1 percent of Sydenham's chorea. This percentage would probably have been higher had these cases been followed after discharge from hospital. These studies and the results of a number of other investigations indicate that a child with almost any form of Sydenham's chorea stands a much greater chance of developing rheumatic heart disease than a child who has never had any form of Sydenham's chorea. This, together with the fact that 10 to 15 percent of cases of rheumatic heart disease give histories of chorea, many without frank attacks of rheumatic fever, suggests that Sydenham's chorea should continue to be regarded as a manifestation of the rheumatic state.

The importance of activity of rheumatic infection is suggested by the fact that 56.4 percent of 3,446 cases of rheumatic heart disease uncomplicated by subacute bacterial endocarditis were regarded as presenting signs of rheumatic activity. This is probably an underestimate. Over 80 percent of cases under age 20 were considered as having active rheumatic infection. Of the 3,654 cases of rheumatic heart disease, including subacute bacterial endocarditis when occurring as a complication, 22.9 percent presented clinical manifestations of

rheumatic arthritis. The percentage of rheumatic heart disease with rheumatic fever was greater among cases under 20 years of age.

Among 324 cases of subacute bacterial endocarditis, 64.5 percent were regarded as superimposed on rheumatic heart disease. Comment is made on the infrequency of subacute bacterial endocarditis as a complication of cardiovascular syphilis.

Comment is made upon the discrepancy in the age distribution of clinical diagnoses of rheumatic fever in hospitals, most of which are either approved for interneship by the American Medical Association or are accredited children's hospitals, and the age distribution of deaths attributed by physicians to rheumatic fever, as indicated by mortality statistics obtained from the local office of vital statistics. This suggests the inadvisability of making rheumatic fever at all ages a notifiable disease. Measures directed toward combating this problem should be concentrated on persons under 20 years of age, the period in which most cases develop.

REFERENCES

(*1*) Hedley, O. F.: Contributions of Edward Jenner to modern concepts of heart disease. Am. J. Pub. Health, **28**: 1165 (1938).
(*2*) Haygarth, John: Clinical History of Diseases. 1. Clinical History of Acute Rheumatism. London, 1805.
(*3*) Hawkins, F. B.: Rheumatism and Some Diseases of the Heart and other Organs (Gulstonian lectures). London, 1826.
(*4*) Bouillaud, J. B.: Nouvelles recherches sur le rheumatisme articulaire (etc.). Paris, 1836.
(*5*) Poynton, F. J., Paterson, Donald, and Spence, J. C.: Acute rheumatism in children under 12 years of age. Lancet, **2**: 1086 (1920).
(*6*) Coombs, Carey F.: Rheumatic Heart Disease. Wm. Wood and Co., New York, 1924.
(*7*) Mackie, Thomas T.: Prognosis and treatment of the rheumatic infection. Am. Heart J., **3**: 31 (1927).
(*8*) Wilson, May G., Lingg, Claire, and Croxford, Geneva: Statistical studies bearing on problems in the classification of heart disease. III. Heart disease in children. Am. Heart J., **4**: 164 (1928).
(*9*) Campbell, Maurice, and Warner, E. C.: A study of rheumatic disease in children. Lancet, **1**: 61 (1930).
(*10*) Findlay, Leonard: The Rheumatic Infection in Childhood. Edward Arnold, London, 1931.
(*11*) Brooks, Harlow, and O'Regan, Charles F.: The manner of the onset of acute rheumatic fever as seen in New York City. Ann. Int. Med., **6**: 717 (1932).
(*12*) Kaiser, A. D.: Factors that influence rheumatic disease in children—based on a study of 1,200 rheumatic children. J. Am. Med. Assoc., **103**: 886 (1934).
(*13*) Jones, T. D., and Bland, E. F.: Clinical significance of chorea as a manifestation of rheumatic fever. J. Am. Med. Assoc., **105**: 571 (1935).
(*14*) Ash, Rachel: Prognosis of rheumatic infection in childhood—a statistical study. Am. J. Dis. Child., **52**: 280 (1936).
(*15*) Sutton, L. P.: Observations on certain etiological factors in rheumatism. Am. Heart J., **4**: 145 (1928).
(*16*) Brenner, O.: Observations on acute rheumatism and rheumatic heart disease based on 227 clinical cases occurring at the Queens Hospital in the 5 years, 1924–1928, and on 133 autopsy cases occurring in the 10 years, 1924–1933. Birmingham Med. Rev., **9**: 193 (1934).
(*17*) Roth, Irving, Lingg, Claire, and Whittemore, Alice: Heart disease in children. Am. Heart J., **13**: 36 (1937).

(*18*) Swift, H. F.: Rheumatic fever, *in* Cecil's Textbook of Medicine, 4th edition. W. B. Saunders, Philadelphia, 1936.
(*19*) Atwater, Reginald M.: Studies in the epidemiology of acute rheumatic fever and related diseases in the United States based on mortality statistics. Am. J. Hyg., **7**: 343 (1927).
(*20*) Swift, H. F.: Rheumatic fever. Am. J. Med. Sci., **170**: 631 (1925).
(*21*) Hedley, O. F.: Trends, geographical and racial distribution of mortality from heart disease among persons 5–24 years of age in the United States during recent years (1922–1936). A preliminary report. Pub. Health Rep., **54**: 2271 (1939).
(*22*) Dublin, L. I., and Lotka, A. J.: Twenty-five Years of Health Progress. Metropolitan Life Insurance Company, New York, 1937.
(*23*) Nomenclature and Criteria for Diagnosis of Diseases of the Heart. 4th and previous editions. New York Tuberculosis and Health Association, New York, 1939.
(*24*) Paul, J. R.: *In* Cyclopedia of Medicine. Edited by George M. Piersol, F. A. Davis, Philadelphia, 1933.
(*25*) Kissane, R. W., and Koons, J. F.: Intrauterine rheumatic heart disease. Arch. Int. Med., **59**: 905 (1933).
(*26*) Richdorf, L. F., and Griffith, W. H.: Polyarthritis: report of a case in an infant 6 days old associated with acute rheumatic fever in the mother. Am. J. Dis. Child., **31**: 250 (1926).
(*27*) White, P. D.: The incidence of endocarditis in earliest childhood. Am. J. Dis. Child., **32**: 536 (1926).
(*28*) Denzer, B. S.: Rheumatic heart disease in children under 2 years of age. J. Am. Med. Assoc., **82**: 1243 (1924).
(*29*) McIntosh, R., and Wood, C. L.: Rheumatic infections occurring in first 3 years of life. Am. J. Dis. Child., **49**: 835 (1935).
(*30*) Eigen, L. A.: Juvenile rheumatic fever. Report of a case in an infant 2 years of age. Am. Heart J., **16**: 363 (1938).
(*31*) Fisher, V. E.: Rheumatic fever at one year. Am. J. Dis. Child., **48**: 590 (1934).
(*32*) Stroud, W. D., Goldsmith, M. A., Polk, D. S., and Thorpe, F. Q.: Ten years observation of children with rheumatic heart disease. J. Am. Med. Assoc., **101**: 502 (1933).
(*33*) Shapiro, M. J.: The natural history of childhood rheumatism in Minnesota. J. Lab. and Clin. Med., **21**: 564 (1936).
(*34*) Taran, L. M.: Rheumatic cardiac disease in childhood; a statistical study. Am. J. Dis. Child., **50**: 840 (1935).
(*35*) DeGraff, Arthur C., and Lingg, Claire: The course of rheumatic heart disease in adults. I. Factors pertaining to age at initial infection, the development of cardiac insufficiency, duration of life, and cause of death. Am. Heart J., **10**: 459 (1935).
(*36*) Leonard, Marion: Puberty and prognosis in rheumatic fever. Am. Heart J., **14**: 192 (1937).
(*37*) Paul, J. R.: Age susceptibility to familial infection in rheumatic fever. J. Clin. Invest., **10**: 53 (1931).
(*38*) Boas, E. P.: Rheumatic fever in adult Puerto Rican immigrants. Am. J. Med. Sci., **182**: 25 (1931).
(*39*) Hedley, O. F.: Mortality from rheumatic heart disease in Philadelphia during 1936. Pub. Health Rep., **52**: 1907 (1937).
(*40*) Mackenzie, Stephen: Report of the Collective Investigations Committee. The British Medical Association. II. Chorea. Brit. Med. J., **1**: 425 (1887).
(*41*) Sturges, Octavius: On Chorea or St. Vitus' Dance in Children. 2d ed. John Bale and Sons, London, 1893.
(*42*) Osler, Sir William: On Chorea and Choreiform Affections. P. Blakistone and Sons, Philadelphia, 1894.
(*43*) Thayer, W. S.: An analysis of 808 cases of chorea, with special reference to the cardiovascular manifestations. J. Am. Med. Assoc., **47**: 1352 (1906).
(*44*) Frazer, M. S.: Relation of chorea to rheumatism: An analysis of 300 cases. Practitioner, **88**: 461 (1912).
(*45*) Abt, I. A., and Levinson, A.: A study of 226 cases of chorea. J. Am. Med. Assoc., **67**: 1342 (1916).
(*46*) Helmholtz, H. F.: Discussion of article by Abt and Levinson. J. Am. Med. Assoc., **67**: 1345 (1916).

(47) Koplik, Henry: The intimate relationship of chorea, rheumatism, and cardiac disease. Contrib. Med. and Biol. Research, dedicated to Sir William Osler, **1**: 620 (1919).
(48) Strong, G. F.: Chorea with particular reference to the cardiac complications. Canad. Med. Assoc. J., **13**: 92 (1923).
(49) Wallace, H. L.: Chorea: A short study of 200 cases. Edinburgh Med. J., **40**: 417 (1933).
(50) Gerstley, J. R., Wile, S. A., Falstein, E. I., and Gayle, M.: Chorea: Is it a manifestation of rheumatic fever? J. Pediat., **6**: 42 (1935).
(51) Schwarz, Herman, and Leader, Sidney:. Latent cardiac complications following Sydenham's chorea. Am. J. Dis. Child., **49**: 952 (1935).
(52) Parrish, Paul L., Taran, Leo M., and Starr, Saul: Incidence of heart disease in cases of Sydenham's chorea. J. Pediat., **11**: 617 (1937).
(53) Sutton, L. P., and Dodge, K. G.: Relationship of Sydenham's chorea to other rheumatic manifestations. Am. J. Med. Sci., **195**: 656 (1938).
(54) Usher, Saul J.: Etiology of chorea: Its relationship to rheumatic fever and heart disease. Canad. Med. Assoc. J., **39**: 565 (1938).
(55) Coburn, A. F., and Moore, Lucile V.: Independence of chorea and rheumatic activity. Am. J. Med. Sci., **193**: 1 (1937).
(56) Love, A. G., and Davenport, C. B.: Defects found in Drafted Men. U. S. Government Printing Office, Washington, 1920.
(57) Willson, Prentiss, and Preece, Alec A.: Chorea gravidarum—a statistical study of 951 collected cases, 846 from the literature and 105 previously unreported. Arch. Int. Med., **49**: 471 and 671 (1932).
(58) Mitchell, Silas Weir: Lectures on Diseases of the Nervous System, Especially in Women. Henry C. Lea's Son and Co., Philadelphia, 1881.
(59) Lueth H. C., and Sutton, Don C.: Chorea in the Negro race. J. Pediat., **3**: 775 (1933).
(60) Starr, M. A.: Discussion of paper by Morris J. Lewis. Trans. Asso. Am. Physicians, **7**: 262 (1892).
(61) McLean, C. C.: Early manifestations of rheumatic infections in young children. Ann. Int. Med., **5**: 1357 (1932).
(62) Laws, C. L., and Levine, S. A.: Clinical notes on rheumatic heart disease with special references to the cause of death. Am. J. Med. Sci., **186**: 833 (1933).
(63) Simmons, Stanley T.: Rheumatic heart disease: Clinical data as observed in Louisville, Kentucky. Am. J. Med. Sci., **187**: 773 (1934).
(64) Winans, H. M., and Dunstan, E. M.: Heart disease in North Texas. Texas State J. Med., **31**: 444 (1935).
(65) Coburn, A. F.: The Factor of Infection in the Rheumatic State. Williams and Wilkins, Baltimore, 1931.
(66) Paul, John R.: The epidemiology of rheumatic fever, a preliminary report, etc., for the American Heart Association. Metropolitan Life Insurance Co., New York, 1930.
(67) Christie, Amos: Rheumatic fever in northern California. Am. Heart J., **12**: 153 (1936).
(68) Hart, A. D., Wood, J. E. Jr., and Daughton, A. D.: Rheumatic fever in Piedmont, Virginia. Incidence and clinical manifestations. Am. J. Med. Sci., **187**: 352 (1934).
(69) White, P. D.: Heart Disease. 2 ed. Macmillan, New York, 1937.
(70) Brink, J. R., and Smith, Harry L.: Subacute bacterial endocarditis—a clinicopathological study of 37 cases. Am. Heart J., **14**: 362 (1937).
(71) Davis, David, and Weiss, Soma: The relation of subacute and acute bacterial endocarditis to rheumatic endocarditis. A study of 66 cases with necropsies. New England J. Med., **208**: 619 (1933).
(72) Horder, T. J.: Infective endocarditis, with an analysis of 150 cases and with special reference to the chronic form of the disease. Quart. J. Med., **2**: 289 (1908–9).
(73) Thayer, W. S.: Studies on bacterial (infective) endocarditis. Johns Hopkins Hosp. Report, **22**: 1–185 (1926).
(74) Blumer, George: Subacute bacterial endocarditis. Medicine, **2**: 105 (1923).
(75) Fulton, Marshall N., and Levine, S. A.: Subacute bacterial endocarditis with special reference to the valvular lesions and previous history. Am. J. Med. Sci., **183**: 60 (1932).
(76) Morrison, Hyman: A study of the incidence of subacute bacterial endocarditis at the Massachusetts General Hospital. Boston Med. and Surg. J., **197**: 46 (1927).

(77) Clawson, B. J.: Endocarditis with special reference to the subacute bacterial type. Arch. Int. Med., **33**: 157 (1924).
(78) Von Glahn, W. C., and Pappenheimer, W. C.: Relationship between rheumatic and subacute bacterial endocarditis. Arch. Int. Med., **55**: 173 (1935).
(79) Bierring, W. L.: Subacute bacterial endocarditis. A clinical study of 30 cases. J. Am. Med. Assoc., **87**: 464 (1926).
(80) Cotton, T. F.: Observations on aortic disease in soldiers. Lancet, **2**: 470 (1919).
(81) Martin, Helen, and Adams, W. D.: Bacterial endocarditis superimposed on syphilitic aortitis and valvulitis—a clinicopathological study with 5 case reports. Am. Heart J., **16**: 714 (1938).
(82) McMillan, Robert L., and Wilbur, Lloyd E.: Staphylococcic endocarditis superimposed on syphilitic aortic endocarditis. J. Am. Med. Assoc., **109**: 1194 (1937).
(83) Briggs, L. H.: Bacterial endocarditis as a sequel to syphilitic valve defect. Am. J. Med. Sci., **164**: 275 (1922).

APPENDICITIS CAUSES FAR TOO MANY DEATHS *

What are the facts?—Deaths from appendicitis in the United States increased from 7,371 in 1900 to over 18,000 in 1930. Although the number of deaths has fallen off since then, it is estimated that about 14,000 people died from this disease in 1939. In 1937, the last year for which reliable information is available, the United States had the second highest death rate from appendicitis in the world. The disease strikes persons of both sexes, and at all ages; neither infants nor old people are spared.

Surely, any disease which causes this many deaths each year is a matter of vital public concern. Appendicitis cannot be prevented, but within certain definite limitations few deaths, if any, need result from this disease.

What is appendicitis?—This disease, the exact cause of which is not known, is an inflammation of the appendix, a dead-end part of the large intestine, about the size of the little finger, located in the lower right quarter of the abdomen.

What to look for in appendicitis.—Persistent pain in the abdomen is the usual early symptom. It begins suddenly and is dull and constant. At first, pain is apt to be in the pit of the stomach. Later, it becomes sharp and cramp-like in the lower right side of the abdomen. The patient usually feels nauseated and may vomit.

If the sharp pain stops suddenly, the appendix has probably burst. This is an exceedingly dangerous sign. If a doctor has not been called already, do not delay another moment. The chances of recovery depend almost entirely on the speed with which medical and surgical care are obtained

Why do people die of appendicitis?—Death from appendicitis results from poisons that seep from the inflamed appendix into other parts

* This material is available in leaflet form and a limited number of copies may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

of the abdomen, or that spread rapidly when the appendix bursts. The inside of the abdomen is covered by a thin film-like tissue (the peritoneum) somewhat like the lining of the inside of the mouth. When more than one-half of the surface of this tissue becomes infected (peritonitis) by the poisons from the appendix, the patient dies. It is well to remember that people do not die of appendicitis itself, but from the spread of the infection.

What is the treatment?—There is no medical cure for appendicitis. The most effective treatment for this disease is early and prompt removal of the inflamed appendix. It is much better to sacrifice an appendix in a timely operation than to lose a human life by delay. Physicians agree that if the operation is performed in time, no one need die of appendicitis, and there is little or no danger from the operation itself. The patient and his family have nothing to fear except the possible bad results of their own delay.

While there is no way to prevent appendicitis, one sure way of avoiding the hazards of this disease is to have the appendix removed. This is suggested especially to those who contemplate taking long trips by sea or land, during which they will be far removed from hospital facilities.

Can deaths from appendicitis be prevented?—The chief danger from appendicitis results from self-doctoring and from delay in calling a doctor. Remember that pain in the abdomen which lasts more than 3 hours is likely to be due to appendicitis, but whether the appendix or some other organ is to blame, such persistence of pain demands that medical opinion be secured. Every year thousands of people suffering from abdominal pain gamble with their lives by dosing themselves with laxatives—the Nation's cure-all—or by taking enemas. The first rule in dealing with appendicitis is to call a physician. The second is to avoid any strain on the large intestine which will cause the diseased appendix to burst. This means, *no laxatives, no enemas.*

Appendicitis will disappear from the list of "killers" if the public will cooperate with the medical profession and follow these four simple rules:

1. Consider any abdominal pain as a dangerous sign.
2. When there is abdominal pain, do not take a laxative, drug, or enema.
3. If pain lasts more than 2 to 3 hours, call a physician. If pain is severe, call a doctor at once.
4. Until the physician arrives, apply an ice bag or other cold application over the painful area in the abdomen.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT. CONSULT YOUR DOCTOR

COURT DECISION ON PUBLIC HEALTH

City health department held without power to make regulations inconsistent with State law and regulations.—(New York Court of Appeals; *S. H. Kress & Co.* v. *Department of Health of City of New York*, 27 N.E.2d 431; decided April 26, 1940.) By statute the State of New York had set up a complete and comprehensive scheme for controlling the manufacture and sale of frozen desserts, which included ice cream. There were provisions regarding, among other things, licensing and the adoption by the commissioner of the department of agriculture and markets of regulations to supplement and give full effect to the law, which latter stated that such regulations should establish "sanitary regulations pertaining to the manufacture and distribution of frozen desserts." Pursuant to the authority given him by the statute the commissioner adopted a regulation prohibiting the manufacture of frozen desserts in the cellar of any building in the State unless special permission therefor should be granted by him. The owner of a department store in New York City was granted permission by the commissioner to manufacture frozen desserts in the cellar of its premises for sale at retail, and the company then applied to the Department of Health of New York City for a permit to manufacture and sell at retail frozen desserts. Such a permit was refused because of a regulation of the city health department prohibiting the manufacture or exposing of frozen desserts in a cellar but empowering the board of health to make exceptions under certain conditions as to cellars used for such purpose before July 11, 1933. Such exception did not apply in the instant case. The city regulation had been adopted in accordance with the power conferred by the State legislature on the city department of health to adopt sections of the sanitary code and regulations thereunder not inconsistent with the constitution or laws of the State. It was conceded by city health department officials that the cellar involved was "without an equal in the city."

The court of appeals said that the question presented was whether the city could, on such facts, forbid that which the State had specifically permitted. It then went on to say that a municipality which was empowered to adopt health regulations could, in spite of general regulations by the State, adopt additional regulations or requirements where there was a real distinction between the city and other parts of the State. Such additional regulations had to be based upon special conditions existing in the city. But the court's view was that that was not the situation in the instant case. Said the court: "The State has gone over the whole field. The State has designated an official who is empowered to grant a permit after he has made an inspection and found the premises to be sanitary. After the issuance of such a

permit nothing remains to be done. The State having covered the whole field, the city may not make regulations of its own, inconsistent with the laws of the State, and prohibit the manufacture of frozen desserts in a cellar even though the cellar is sanitary and the manufacture of frozen desserts therein has been authorized by the State."

DEATHS DURING WEEK ENDED AUGUST 31, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 31, 1940	Corresponding week, 1939
Data from 87 large cities of the United States:		
Total deaths	7,241	[1] 7,019
Average for 3 prior years	7,184	
Total deaths, first 35 weeks of year	299,080	293,098
Deaths under 1 year of age	497	[1] 482
Average for 3 prior years	497	
Deaths under 1 year of age, first 35 weeks of year	17,552	17,633
Data from industrial insurance companies:		
Policies in force	64,914,214	66,767,719
Number of death claims	10,089	10,388
Death claims per 1,000 policies in force, annual rate	8.1	8.1
Death claims per 1,000 policies, first 35 weeks of year, annual rate	9.0	10.4

[1] Data from 88 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 7, 1940

Summary

A total of 758 cases of poliomyelitis was reported for the current week as compared with 606 for the preceding week and with a 5-year (1935–39) median of 436. The incidence continues heaviest in the East North Central and West North Central States, which reported 555 cases, or 73 percent of the current total, as compared with 405 cases, or 67 percent of the total reported last week. The cases of poliomyelitis reported since August 3 are given in the following table, by geographic areas:

Geographical area	Week ended—				
	Aug. 10	Aug. 17	Aug. 24	Aug. 31	Sept. 7
New England	3	11	5	4	5
Middle Atlantic	6	11	25	37	32
East North Central	92	144	256	263	346
West North Central	61	80	162	142	209
South Atlantic	28	46	59	57	74
East South Central	20	25	24	18	23
West South Central	23	23	39	19	15
Mountain	12	9	26	30	14
Pacific	30	40	27	36	40
Total	275	389	623	606	758

Increases for the current week are shown for all States in the East North Central group, the largest number of cases (139) being reported from Michigan, and for all States but one in the West North Central group, the largest number of cases (80) being reported from Iowa. In the South Atlantic area the cases reported in West Virginia increased from 41 during the preceding week to 51 and in Virginia from 7 to 17. Increases in the Pacific States were confined to Oregon and California.

255670°—40——4

Conditions with respect to the other 8 communicable diseases included in the weekly reports remained favorable, the cases in most instances being below the 5-year median expectancy. A new record was made for smallpox. For the first time since these weekly reports have been compiled, no case of smallpox was reported by any State.

Seventy-one cases of endemic typhus fever were reported, 25 of which were in Georgia, 17 in Alabama, and 12 in Texas.

For the current week the Bureau of the Census reported 7,313 deaths in 88 major cities of the United States, as compared with 7,274 for the preceding week, and with a 3-year (1937–39) average of 6,928 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended September 7, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939	
NEW ENG.												
Maine	1	1	1	—	—	—	14	1	1	0	0	0
New Hampshire	0	0	0	—	—	—	0	0	0	0	0	0
Vermont	0	0	0	—	—	—	0	14	4	0	0	0
Massachusetts	2	1	2	—	—	—	31	13	13	0	1	1
Rhode Island	0	0	0	—	—	—	0	4	0	0	0	0
Connecticut	0	0	0	1	—	—	5	5	3	0	0	0
MID. ATL.												
New York	8	13	15	[1] 8	[1] 1	[1] 2	102	46	74	0	3	3
New Jersey [2]	4	1	3	5	3	4	43	12	12	0	1	1
Pennsylvania [2]	5	10	18	—	—	—	33	17	27	4	3	2
E. NO. CEN.												
Ohio	3	15	15	19	1	1	18	10	12	1	3	2
Indiana [2]	4	19	12	8	4	11	5	4	6	1	0	1
Illinois [2]	9	14	14	3	3	6	23	14	10	0	1	3
Michigan [3]	4	5	7	5	—	—	51	4	13	1	0	2
Wisconsin	1	2	2	15	29	11	53	22	28	1	0	1
W. NO. CEN.												
Minnesota	7	5	5	1	2	—	9	6	6	0	0	0
Iowa	4	2	5	4	—	—	8	6	3	0	0	0
Missouri	8	2	13	1	—	8	2	0	4	0	0	1
North Dakota	6	1	1	2	1	—	0	1	1	0	0	0
South Dakota	1	0	0	—	—	—	0	2	0	0	0	0
Nebraska	1	0	1	—	—	—	2	1	1	1	0	0
Kansas	4	7	7	1	—	—	4	3	3	1	0	0
SO. ATL.												
Delaware	1	0	0	—	—	—	1	1	0	0	0	0
Maryland [2 3]	1	3	3	2	—	1	5	1	4	0	1	1
Dist. of Col.	1	1	4	—	—	1	1	1	1	0	0	0
Virginia [2]	8	45	37	76	77	—	10	5	5	0	1	2
West Virginia [3]	7	7	7	15	3	10	2	1	1	3	1	1
North Carolina [4]	24	60	38	1	—	2	8	2	7	3	1	2
South Carolina [4]	7	30	24	120	101	94	18	2	2	0	2	0
Georgia [4]	10	34	31	14	22	—	2	1	0	0	0	1
Florida [4]	3	9	8	1	7	—	2	4	2	0	0	1
E. SO. CEN.												
Kentucky	3	9	14	1	5	5	7	1	3	0	2	2
Tennessee [2 4]	8	16	22	11	11	11	25	7	5	0	0	1
Alabama [4]	6	41	31	3	36	26	5	2	3	1	1	1
Mississippi [3 4]	18	20	25	—	—	—	—	—	—	2	0	0
W. SO. CEN.												
Arkansas	5	15	15	3	3	3	8	4	4	0	1	1
Louisiana [4]	7	5	5	—	6	6	2	0	3	0	1	0
Oklahoma [2]	3	6	11	15	5	12	2	4	4	0	1	0
Texas [1]	13	24	29	101	35	35	15	28	8	1	0	2
MOUNTAIN												
Montana	0	3	1	4	26	4	4	1	2	0	0	0
Idaho	0	1	1	—	—	—	0	4	1	0	0	0
Wyoming [2]	0	2	0	—	—	—	1	2	2	0	0	0
Colorado	13	3	5	1	10	—	3	9	9	0	1	1
New Mexico	5	0	4	—	—	—	5	0	1	0	0	0
Arizona	0	0	1	10	14	14	3	8	3	0	3	0
Utah [3]	1	0	0	2	2	—	6	12	3	0	0	0
PACIFIC												
Washington	0	1	1	—	—	—	8	30	13	2	0	1
Oregon [2]	3	0	0	1	3	5	5	4	4	0	0	0
California	8	10	20	4	11	11	25	21	23	0	1	1
Total	227	455	455	458	511	346	576	335	438	22	29	44
36 weeks	9, 458	13, 142	15, 998	170, 447	152, 791	142, 304	230, 613	340, 706	340, 706	1, 191	1, 452	4, 330

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 7, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939	
NEW ENG.												
Maine	0	0	2	0	1	4	0	0	0	1	0	3
New Hampshire	0	3	0	1	0	0	0	0	0	0	1	0
Vermont	0	2	1	0	0	1	0	0	0	0	0	0
Massachusetts	3	5	5	22	18	23	0	0	0	2	3	5
Rhode Island	0	0	0	1	2	3	0	0	0	3	0	0
Connecticut	2	4	4	4	2	7	0	0	0	4	1	2
MID. ATL.												
New York	17	88	88	56	35	61	0	0	0	11	19	30
New Jersey [2]	4	43	13	26	25	18	0	0	0	3	7	14
Pennsylvania [2]	11	20	9	52	44	52	0	0	0	30	28	28
E. NO. CEN.												
Ohio	56	17	2	52	98	88	0	0	0	26	29	29
Indiana [2]	81	3	3	16	46	35	0	1	1	9	12	12
Illinois [2]	40	13	22	75	72	84	0	0	0	17	59	35
Michigan [3]	139	66	49	47	59	59	0	0	0	7	5	10
Wisconsin	30	5	4	48	61	46	0	0	0	0	4	4
W. NO. CEN.												
Minnesota	12	46	5	20	27	27	0	0	0	1	0	2
Iowa	80	2	3	13	7	18	0	1	1	0	6	5
Missouri	32	0	2	13	9	29	0	1	0	9	5	23
North Dakota	0	1	0	2	9	5	0	0	1	0	1	2
South Dakota	9	0	0	8	3	0	0	2	0	0	0	1
Nebraska	18	1	1	2	10	9	0	1	1	0	0	0
Kansas	58	0	0	24	32	31	0	0	1	7	7	9
SO. ATL.												
Delaware	0	0	0	1	0	0	0	0	0	2	4	1
Maryland [2] [3]	0	2	2	13	14	15	0	0	0	1	6	11
Dist. of Col.	0	3	2	2	4	4	0	0	0	0	1	1
Virginia [2]	17	5	4	16	19	18	0	0	0	12	19	19
West Virginia [3]	51	1	2	15	29	29	0	0	0	9	23	19
North Carolina [4]	5	9	1	38	34	34	0	0	0	16	9	13
South Carolina [4]	1	12	1	7	16	7	0	0	0	21	18	19
Georgia [4]	0	0	0	19	14	13	0	0	0	39	15	23
Florida [4]	0	1	1	1	5	4	0	0	0	2	1	2
E. SO. CEN.												
Kentucky	17	3	4	20	27	27	0	0	0	13	27	40
Tennessee [3] [4]	3	3	3	0	51	27	0	0	0	24	27	28
Alabama [4]	2	0	4	13	34	13	0	0	0	12	12	14
Mississippi [3] [4]	1	0	0	9	11	9	0	0	0	13	6	13
W. SO. CEN.												
Arkansas	3	1	1	3	10	8	0	0	0	36	25	20
Louisiana [4]	2	1	2	2	7	3	0	0	0	25	11	19
Oklahoma [2]	6	2	1	9	6	8	0	0	1	28	30	26
Texas [4]	4	12	3	11	24	24	0	0	0	50	40	47
MOUNTAIN												
Montana	8	0	1	11	3	5	0	0	2	1	2	4
Idaho	2	0	0	10	2	2	0	0	0	2	3	3
Wyoming [2]	0	0	0	2	1	2	0	0	1	0	0	1
Colorado	3	5	2	11	8	8	0	2	2	6	13	6
New Mexico	1	3	1	0	7	5	0	0	0	9	5	6
Arizona	0	5	1	1	0	2	0	0	0	3	11	5
Utah [3]	0	0	0	4	6	6	0	0	0	0	0	1
PACIFIC												
Washington	14	0	1	5	13	10	0	0	10	1	2	2
Oregon [2]	5	4	0	3	6	7	0	0	3	1	5	5
California	21	45	25	45	51	64	0	6	2	7	15	15
Total	758	436	436	748	962	962	0	14	39	463	517	614
36 weeks	4,046	3,454	3,454	120,804	118,940	167,490	1,988	8,721	8,136	6,247	8,748	9,882

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 7, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued.

Division and State	Whooping cough, Week ended Sept. 7, 1940	Whooping cough, Week ended Sept. 9, 1939
NEW ENG.		
Maine	38	11
New Hampshire	0	0
Vermont	11	20
Massachusetts	72	94
Rhode Island	0	30
Connecticut	44	63
MID. ATL.		
New York	266	316
New Jersey [2]	95	157
Pennsylvania [2]	250	299
E. NO. CEN.		
Ohio	335	167
Indiana [2]	11	58
Illinois [2]	176	227
Michigan [3]	173	131
Wisconsin	73	156
W. NO. CEN.		
Minnesota	22	59
Iowa	25	13
Missouri	30	13
North Dakota	3	15
South Dakota	2	4
Nebraska	8	5
Kansas	33	8
SOUTH ATLANTIC		
Delaware	7	5
Maryland [2] [3]	61	42
District of Columbia	3	11
Virginia [2]	80	39
West Virginia [3]	38	6
SOUTH ATLANTIC—continued		
North Carolina [4]	60	109
South Carolina [4]	16	36
Georgia [4]	23	32
Florida [4]	0	1
EAST SOUTH CENTRAL		
Kentucky	41	34
Tennessee [2] [4]	33	28
Alabama [4]	7	14
Mississippi [3] [4]		
WEST SOUTH CENTRAL		
Arkansas	19	2
Louisiana [4]	4	5
Oklahoma [2]	12	7
Texas [4]	184	49
MOUNTAIN		
Montana	8	10
Idaho	0	4
Wyoming [2]	3	2
Colorado	14	23
New Mexico	18	6
Arizona	2	5
Utah [3]	24	44
PACIFIC		
Washington	48	18
Oregon [2]	5	21
California	215	71
Total	2,542	2,470
36 weeks	114,846	134,239

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Sept. 7, 1940, 14 cases as follows: New Jersey, 1; Pennsylvania, 1, Indiana, 2; Illinois, 2; Maryland, 1; Virginia, 3; Tennessee, 1; Oklahoma, 1; Wyoming, 1; Oregon, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Sept. 7, 1940; 71 cases as follows: North Carolina, 1; South Carolina, 4; Georgia, 25; Florida, 4; Tennessee, 2; Alabama, 17; Mississippi, 2; Louisiana, 4; Texas, 12.

WEEKLY REPORTS FROM CITIES

City reports for week ended August 24, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	81	28	11	197	266	235	3	335	78	1,196	--------
Current week [1]	42	20	5	286	208	154	2	331	72	1,006	--------
Maine											
Portland	0	-----	0	0	0	1	0	0	0	4	19
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	4
Manchester	0	------	0	0	0	0	0	0	0	0	13
Nashua	0	------	0	0	0	0	0	0	0	0	12
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	10
Rutland	0	------	0	0	3	0	0	0	0	0	5
Massachusetts:											
Boston	0	------	0	25	2	8	0	8	2	62	166
Fall River	0	------	0	1	0	0	0	2	1	5	36
Springfield	0	------	0	0	0	0	0	0	0	2	28
Worcester	0	------	0	9	2	1	0	0	0	2	27
Rhode Island:											
Pawtucket	1	------	0	0	0	0	0	0	0	0	19
Providence	0	------	0	10	1	0	0	1	1	7	49
Connecticut:											
Bridgeport	0	------	0	0	1	0	0	1	3	0	26
Hartford	0	------	0	1	1	0	0	0	0	1	38
New Haven	0	------	0	2	2	0	0	0	0	22	32
New York:											
Buffalo	0	------	0	0	3	3	0	4	0	5	96
New York	7	4	0	55	22	26	0	68	11	117	1,142
Rochester	0	------	0	1	7	1	0	1	0	10	51
Syracuse	0	------	0	0	3	0	0	1	1	5	46
New Jersey:											
Camden	0	------	0	1	4	1	0	0	1	0	30
Newark	0	------	0	23	1	4	0	1	0	32	71
Trenton	1	------	0	0	1	0	0	3	1	5	43
Pennsylvania:											
Philadelphia	1	2	1	27	8	7	0	12	4	71	423
Pittsburgh	0	------	0	3	7	3	0	6	0	23	120
Reading	0	------	0	1	1	0	0	2	0	25	25
Scranton	0	------	--------	0	-------	1	0	-------	0	0	--------
Ohio:											
Cincinnati	0	------	0	0	2	1	0	11	0	15	114
Cleveland	0	6	0	2	4	2	0	11	2	59	182
Columbus	2	------	0	1	0	2	0	1	0	39	70
Toledo	0	------	0	0	2	0	0	3	0	7	62
Indiana:											
Anderson	0	------	0	1	0	0	0	0	0	0	10
Fort Wayne	0	------	0	0	0	1	0	1	0	1	24
Indianapolis	0	------	1	0	2	1	0	3	1	6	81
Muncie	0	------	0	0	2	0	0	1	0	1	8
South Bend	0	------	0	0	0	0	0	0	0	0	15
Terre Haute	0	------	0	0	0	0	0	0	0	0	19
Illinois:											
Alton	0	------	0	0	3	0	0	0	0	0	10
Chicago	2	------	1	16	17	19	0	44	4	75	547
Elgin	0	------	0	0	1	0	0	0	0	4	8
Moline	0	------	0	0	0	0	0	0	0	0	8
Springfield	0	------	0	0	2	0	0	0	0	4	22
Michigan:											
Detroit	0	------	0	39	6	14	0	20	1	84	210
Flint	0	------	0	2	2	0	0	0	1	3	20
Grand Rapids	0	------	0	1	0	0	0	0	0	19	38
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	0	9
Madison	0	------	0	1	2	0	0	0	0	0	21
Milwaukee	0	------	0	17	0	4	0	0	1	10	79
Racine	0	------	0	0	0	0	0	0	0	2	7
Superior	0	------	0	0	0	1	0	0	0	0	6

[1] Figures for Barre and Boise estimated; reports not received.

City reports for week ended August 24, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping-cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	0	0	0	2	0	0	1	7
Minneapolis	0	------	0	1	2	2	0	2	0	13	72
St. Paul	0	------	0	0	3	3	0	1	0	3	57
Iowa:											
Cedar Rapids	0	------	--------	0	-------	1	0	-------	0	0	--------
Davenport	0	------	--------	0	-------	0	0	-------	0	1	--------
Des Moines	2	------	0	0	0	1	0	0	0	1	29
Sioux City	0	------	--------	0	-------	0	0	-------	0	1	--------
Waterloo	0	------	--------	0	-------	1	0	-------	0	0	--------
Missouri:											
Kansas City	0	------	0	0	3	0	0	3	1	3	82
St. Joseph	0	------	0	1	2	0	0	2	1	0	33
St. Louis	1	1	0	0	5	5	0	7	1	17	176
North Dakota:											
Fargo	0	------	0	0	1	0	0	0	0	1	6
Grand Forks	0	------	--------	0	-------	0	0	-------	0	1	--------
Minot	0	------	0	0	0	0	0	0	0	0	11
South Dakota:											
Aberdeen	0	------	--------	0	-------	0	0	-------	0	1	--------
Sioux Falls	0	------	0	0	0	1	0	0	0	0	8
Nebraska:											
Lincoln	0	------	--------	0	-------	0	0	-------	0	0	--------
Omaha	0	------	0	0	1	1	0	1	0	1	51
Kansas:											
Lawrence	0	------	0	1	0	0	0	0	0	0	3
Topeka	0	------	0	0	1	1	0	0	0	1	15
Wichita	0	------	0	0	2	1	0	1	0	3	31
Delaware:											
Wilmington	0	------	0	0	3	1	0	2	0	0	26
Maryland:											
Baltimore	1	3	1	1	7	1	0	11	0	77	185
Cumberland	0	------	0	0	0	0	0	0	0	0	11
Frederick	0	------	0	0	0	0	0	0	0	1	2
Dist. of Col.:											
Washington	3	------	0	2	7	3	0	13	5	6	119
Virginia:											
Lynchburg	0	------	0	1	0	0	0	0	0	1	9
Norfolk	0	------	0	0	0	1	0	0	0	4	27
Richmond	0	------	0	1	1	4	0	1	0	0	38
Roanoke	0	------	0	2	1	0	0	0	0	11	7
West Virginia:											
Charleston	0	------	0	0	1	0	0	0	0	0	20
Huntington	0	------	--------	0	-------	0	0	-------	0	0	--------
Wheeling	1	------	0	0	2	0	0	1	1	6	22
North Carolina:											
Gastonia	0	------	--------	0	-------	0	0	-------	0	0	--------
Raleigh	0	------	0	0	0	0	0	0	0	1	10
Wilmington	0	------	0	0	0	0	0	1	0	0	15
Winston-Salem	1	------	0	1	0	2	0	0	0	9	25
South Carolina:											
Charleston	0	2	0	13	2	0	0	1	2	0	24
Florence	0	------	0	0	0	0	0	0	0	0	8
Greenville	0	------	0	0	1	0	0	1	0	0	11
Georgia:											
Atlanta	3	------	0	0	0	4	0	7	0	2	76
Brunswick	0	------	0	0	0	0	0	0	0	0	2
Savannah	0	------	0	0	1	0	0	1	0	0	29
Florida:											
Miami	0	1	1	0	0	0	0	1	0	1	30
Tampa	0	------	0	0	2	0	0	1	0	0	30
Kentucky:											
Ashland	0	------	0	0	0	0	0	1	0	0	4
Covington	0	------	0	0	0	0	0	0	0	1	1
Lexington	0	------	0	9	0	1	0	1	0	2	12
Louisville	0	------	0	3	1	2	0	1	0	0	57
Tennessee:											
Knoxville	0	------	0	0	0	0	0	0	1	0	24
Memphis	1	------	0	0	1	0	0	4	10	11	72
Nashville	0	------	1	5	4	0	0	2	3	6	60
Alabama:											
Birmingham	0	------	0	1	4	2	0	4	0	0	81
Mobile	0	------	0	0	2	0	0	0	0	0	24
Montgomery	0	------	--------	0	-------	0	0	-------	0	0	--------

City reports for week ended August 24, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet-fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping-cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0	------	--------	0	-------	0	0	-------	0	0	--------
Little Rock	0	------	0	0	0	0	0	0	0	0	--------
Louisiana:											
Lake Charles	0	------	0	0	1	0	0	1	0	0	4
New Orleans	6	------	0	2	9	0	0	11	1	15	149
Shreveport	1	------	0	0	4	0	0	4	3	0	64
Oklahoma:											
Oklahoma City	0	------	1	0	3	1	0	0	0	0	33
Tulsa	0	------	0	1	0	0	0	2	0	4	30
Texas:											
Dallas	1	------	0	1	0	0	0	1	0	0	61
Fort Worth	0	------	0	0	0	6	0	1	0	2	23
Galveston	0	------	0	0	1	1	0	0	1	0	12
Houston	1	------	0	2	2	0	0	5	2	1	87
San Antonio	1	------	0	0	7	0	0	8	2	21	57
Montana:											
Billings	0	------	0	0	1	0	0	0	0	4	5
Great Falls	0	------	0	1	0	0	0	0	0	3	8
Helena	0	------	0	0	0	0	0	0	0	0	6
Missoula	0	------	0	0	0	0	0	0	0	0	8
Idaho:											
Boise	-------	------	--------	-------	-------	-------	-------	------	-------	--------	--------
Colorado:											
Colorado Springs	0	------	0	0	0	0	0	1	0	0	4
Denver	5	------	0	0	4	3	0	4	0	6	89
Pueblo	0	------	0	0	1	1	0	0	0	0	13
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	3	0	1	10
Utah:											
Salt Lake City	0	------	0	3	4	3	0	1	1	8	33
Washington:											
Seattle	0	------	0	1	4	1	0	2	2	9	93
Spokane	0	------	0	0	0	2	0	0	0	0	27
Tacoma	0	------	0	0	2	0	0	0	0	0	44
Oregon:											
Portland	0	------	0	2	1	3	0	1	0	5	77
Salem	0	------	--------	0	-------	0	0	-------	0	0	--------
California:											
Los Angeles	3	2	0	8	2	5	0	22	0	90	301
Sacramento	0	------	0	2	1	5	0	1	1	1	26
San Francisco	0	------	0	0	7	2	0	5	0	19	150

City reports for week ended August 24, 1940—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths	
Massachusetts:			
Worcester	1	0	1
New York:			
Buffalo	0	0	1
New York	1	0	1
Rochester	0	1	1
Pennsylvania:			
Philadelphia	0	0	5
Pittsburgh	0	0	1
Ohio:			
Cincinnati	0	0	8
Cleveland	0	0	1
Indiana:			
Anderson	0	0	1
Fort Wayne	0	0	4
Indianapolis	1	1	4
South Bend	0	0	6
Terre Haute	0	0	1
Illinois:			
Chicago	1	0	6
Moline	0	0	1
Springfield	0	0	1
Michigan:			
Detroit	0	0	3
Grand Rapids	0	0	5
Wisconsin:			
Madison	0	0	10
Minnesota:			
Duluth	0	0	1
Iowa:			
Cedar Rapids	1	0	0
Des Moines	0	0	2
Sioux City	0	0	3
Waterloo	0	0	7
Missouri:			
Kansas City	0	0	4
St. Joseph	1	1	0
St. Louis	0	0	1
South Dakota:			
Sioux Falls	0	0	1
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	5
Kansas:			
Topeka	0	0	1
Wichita	0	0	2
Virginia:			
Richmond	0	0	1
West Virginia:			
Huntington	0	0	11
Kentucky:			
Ashland	0	0	2
Louisiana:			
New Orleans	0	0	6
Shreveport	0	0	1
Oklahoma:			
Oklahoma City	1	0	0
Texas:			
Dallas	0	0	2
Houston	0	0	2
Montana:			
Billings	0	0	1
Helena	0	0	1
Colorado:			
Denver	0	0	1
New Mexico:			
Albuquerque	0	0	1
Utah:			
Salt Lake City	0	0	2
Washington:			
Seattle	0	0	4
Tacoma	0	0	3
Oregon:			
Portland	0	0	1
California:			
Los Angeles	0	0	7
Sacramento	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Newark, 1; Topeka, 1; Denver, 1; Sacramento, 3.

Pellagra.—Cases: Boston, 1; Birmingham, 3; San Francisco, 1.

Typhus fever.—Cases: New York, 3; Savannah, 4; Birmingham, 1; Montgomery, 1; New Orleans, 1; Houston, 4.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 3, 1940.—During the week ended August 3, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1		1	1			1		4
Chickenpox		1	1	118	160	14	12	3	11	320
Diphtheria		3		14		2	1			20
Dysentery					1					1
Influenza		3							60	63
Lethargic encephalitis									1	1
Measles	12			37	98	34	42	12	18	253
Mumps				1	36		1	2	3	43
Pneumonia		1			7		1		4	13
Poliomyelitis		1		2	1					4
Scarlet fever		1		29	42	10	5	6	6	99
Tuberculosis			4	77	69	5		4		159
Typhoid and paratyphoid fever			3	5	7				3	18
Whooping cough			2	178	79	9	27	6	35	336

CUBA

Provinces—Notifiable diseases—4 weeks ended June 22, 1940.—During the 4 weeks ended June 22, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		2	2	8		11	23
Chickenpox		1				3	4
Diphtheria	1	9		2		1	13
Leprosy		1				1	2
Malaria	6	5		7	1	55	74
Measles		3	2	6	1		12
Poliomyelitis		1		3			4
Scarlet fever		3					3
Tuberculosis	19	49	16	68	5	30	187
Typhoid fever	22	116	10	16	26	36	228

SWEDEN

Notifiable diseases—June 1940.—During the month of June 1940, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Poliomyelitis	15
Diphtheria	42	Scarlet fever	2, 195
Dysentery	11	Syphilis	33
Epidemic encephalitis	2	Typhoid fever	2
Gonorrhea	779	Undulant fever	10
Paratyphoid fever	37	Weil's disease	2

YUGOSLAVIA

Notifiable diseases—4 weeks ended June 16, 1940.—During the 4 weeks ended June 16, 1940, certain notifiable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	23	1	Poliomyelitis	2	1
Cerebrospinal meningitis	277	39	Scarlet fever	202	1
Diphtheria and croup	355	21	Sepsis	3	2
Dysentery	19	2	Tetanus	40	13
Erysipelas	127	4	Typhoid fever	191	9
Favus	2		Typhus fever	32	9
Lethargic encephalitis	1		Whooping cough	1	
Paratyphoid fever	24				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of August 30, 1940, pages 1594–1597. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Macao.—During the week ended August 31, 1940, 20 cases of cholera were reported in Macao, China.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Area.—A rat found near Kukaiau on August 6, 1940, and another rat found on August 7, 1940, near Paauilo, both in Hamakua Mill Area, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

Yellow Fever

Ivory Coast—Tekodogo Circle.—During the week ended August 10, 1940, 2 suspected cases of yellow fever were reported in Tekodogo Circle, Ivory Coast.

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Public Health Reports

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IN THIS ISSUE

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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RHEUMATIC HEART DISEASE IN PHILADELPHIA HOSPITALS [1]

A Study of 4,653 Cases of Rheumatic Heart Disease, Rheumatic Fever, Sydenham's Chorea, and Subacute Bacterial Endocarditis Involving 5,921 Admissions to Philadelphia Hospitals From January 1, 1930, to December 31, 1934

III. FATAL RHEUMATIC HEART DISEASE AND SUBACUTE BACTERIAL ENDOCARDITIS

By O. F. Hedley, *Surgeon, United States Public Health Service*

Among the 5,921 admissions involving rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis to Philadelphia hospitals from January 1, 1930, to December 31, 1934, 1,020, or 17.2 percent, are known to have terminated fatally. These deaths occurred during the period under study or before the end of an admission begun prior to January 1, 1935. Excluding subacute bacterial endocarditis apparently not superimposed on rheumatic heart disease, death was attributed to rheumatic conditions in 916, or 15.8 percent, of 5,801 admissions. Of the 4,869 admissions involving rheumatic heart disease, some of which were complicated by rheumatic fever and Sydenham's chorea, 732, or 15.0 percent, resulted fatally.

Of 4,653 cases (in contradistinction to admissions) of rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis, 21.9 percent ended fatally. Excluding subacute bacterial endocarditis apparently not superimposed on rheumatic heart disease, death occurred among 916, or 20.2 percent, of 4,538 cases with various rheumatic manifestations, including subacute bacterial endocarditis superimposed on rheumatic heart disease. Of 3,445 cases of rheumatic heart disease, excluding all subacute bacterial endocarditis, 732, or 21.3 percent, terminated in death.

CAUSE OF FINAL ADMISSION

Subacute bacterial endocarditis apparently not engrafted on rheumatic heart disease was the cause of death in 104, or 10.2 percent, of

[1] From the Division of Infectious Diseases, National Institute of Health.

these 1,020 fatal cases. Of the 916 fatal cases involving rheumatic heart disease, 677, or 73.9 percent, were admitted primarily for rheumatic heart disease, rheumatic fever, or Sydenham's chorea; 184, or 20.1 percent, for subacute bacterial endocarditis superimposed on rheumatic heart disease; 21, or 2.3 percent, for obstetrical conditions; 17, or 1.8 percent, for medical conditions unrelated to rheumatic infection or heart disease; while 17, or 1.8 percent, were admitted for surgical conditions, including 4 tonsillectomies. Of the entire series of 1,020 fatal cases, 288, or 28.2 percent, were admitted primarily for subacute bacterial endocarditis. Of the 916 fatal cases of rheumatic heart disease, 94.0 percent were admitted for rheumatic conditions.

CAUSE OF DEATH

The cause of 104 deaths, 10.2 percent of the entire series of 1,020 fatal cases, was subacute bacterial endocarditis, the relation of which to rheumatic heart disease was not determined. Of the 916 fatal cases of rheumatic heart disease, 901, or 98.4 percent, were due primarily to rheumatic heart disease including deaths from subacute bacterial endocarditis when occurring as a complicating factor.

The causes of the other 15 deaths were:

	Number of deaths
Empyema	1
Heat stroke	1
Automobile accidents	2
During surgical operations (possibly due in part to rheumatic heart disease)	3
Anterior poliomyelitis	1
Diabetes mellitus	2
Hypertensive cardiovascular disease	1
Puerperal sepsis	1
Postpartum hemorrhage	2
Extrauterine pregnancy	1
Total	15

Since only 1.6 percent of these 916 deaths were attributable to conditions other than rheumatic heart disease and its sequellae, these deaths do not influence the situation to any great extent; consequently, they will not be considered in detail.

With one possible exception, review of the hospital records of these 916 fatal cases indicated that all were due to rheumatic heart disease. The case in point was a 2-year-old child who was admitted during the first attack of rheumatic fever and apparently died of rheumatic pneumonitis. No necropsy was obtained. In view of the age of the patient and the likelihood that clinical signs of heart disease were obscured by the pulmonary condition, there is more than a strong presumption that the patient also had fulminating rheumatic carditis.

Serious involvement of the lungs in rheumatic fever in the absence of active rheumatic cardiac disease is extremely rare.

Rheumatic fever occurred during 74 admissions which terminated fatally, while Sydenham's chorea was indicated during the final admission in 6 fatal cases. The arthritic manifestations of rheumatic fever and the cerebral manifestations of chorea were never sufficient to cause death. No deaths occurred among patients with these conditions unless rheumatic heart disease was also present. This emphasizes the fact that rheumatic heart disease constitutes the crux of this problem. Incidentally, from the viewpoint of vital statistics, deaths attributed to rheumatic fever or Sydenham's chorea should be considered as due to rheumatic heart disease, since if the diagnosis is correct they are almost invariably due to cardiac involvement.

Davis and Weiss (*1*) reported 474 cases of rheumatic heart disease among 5,215 consecutive post-mortem examinations at the Boston City Hospital. Rheumatic heart disease was directly responsible for death in 164 cases, or 34.6 percent, while infective endocarditis, either acute or subacute, superimposed on rheumatic heart disease was the cause of an additional 13 percent of deaths. Rheumatic heart disease was a contributory factor in 41 instances, or 8.6 percent of the fatal cases. In 205, or 43.2 percent, of the 474 fatal cases with rheumatic heart disease, the character of the cardiac involvement indicated that rheumatic heart disease was not the cause of death. The reason for the marked difference in the percentage of deaths directly attributable to rheumatic heart disease is presumably because Davis and Weiss' series consisted of consecutive post-mortem examinations. Rheumatic cardiac lesions which were not diagnosed clinically were probably often discovered at necropsy. In the present series, most of the patients were admitted for rheumatic heart disease and succumbed to that condition. A careful autopsy study of persons in Philadelphia dying from other conditions would probably reveal cases of rheumatic heart disease undetected during life.

PLACE OF DEATH

According to table 1, 962, or 94.3 percent, of these 1,020 deaths occurred in hospitals. A search of the records of the local office of vital statistics of the State Department of Health indicated that 54 patients, or 5.3 percent, died before the end of 1934 after discharge from a hospital. A small number of deaths subsequent to discharge from a hospital may have been missed because the death may have been due to a cause other than heart disease or because the name on the death certificate was different from that indicated on the hospital record. This is especially likely to occur among persons of foreign birth or extraction who Anglicize their names.

As indicated in table 1, 744, or 72.9 percent, of the 1,020 deaths from rheumatic heart disease and subacute bacterial endocarditis occurred during the initial admission in the period under study. This admission, especially during the first 2 years of the study, was not always the first admission to a hospital, since some of the patients had been admitted prior to 1930. Over a period of several years the number of deaths during the initial admission among patients previously admitted is counterbalanced to a certain extent by deaths occurring during admissions subsequent to the end of the period under study. For this reason it is believed that the figures in table 1 closely approximate the actual distribution of admissions in which death occurs. The occurrence of such a large proportion of deaths during the initial admission indicates that many patients are not hospitalized except as a last resort. Most of the other deaths were during the second and third admissions. Only 2.5 percent of deaths in hospitals occurred subsequent to the third admission. Four deaths were included among patients who were admitted prior to the end of 1934 and died early in 1935.

TABLE 1.—*Number of admissions or place of death of 1,020 fatal cases of rheumatic heart disease and subacute bacterial endocarditis admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Number of admissions or place of death	All deaths from rheumatic heart disease and subacute bacterial endocarditis		Rheumatic heart disease uncomplicated by subacute bacterial endocarditis		Subacute bacterial endocarditis on rheumatic heart disease		Subacute bacterial endocarditis not on rheumatic heart disease	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Initial admission during 5-year period	744	72.9	495	67.6	157	85.3	92	88.5
Second admission during 5-year period	150	14.7	136	18.6	10	5.4	4	3.8
Third admission during 5-year period	43	4.3	43	5.9	0	0	0	0
Subsequent admissions during 5-year period	25	2.5	25	3.4	0	0	0	0
After discharge from hospital	54	5 3	31	4.2	16	8.7	7	6.7
Subsequent to 1934	4	.4	2	.3	1	.5	1	1 0
Total	1,020	100	732	100	184	100	104	100

Of the 916 deaths from rheumatic heart disease, including 184 from superimposed subacute bacterial endocarditis, 652, or 71.2 percent, occurred during the initial admission under study. Only 67.6 percent of 732 deaths from rheumatic heart disease uncomplicated by subacute bacterial endocarditis occurred during the initial admission under study. Of the 288 fatal cases of subacute bacterial endocarditis, only 14 were admitted more than once. This was not influenced by the relationship of subacute bacterial endocarditis to rheumatic heart disease. Somewhat more deaths from subacute bacterial endocarditis than from rheumatic heart disease occurred after discharge

from hospitals. This is only to be expected since this disease not infrequently drags on for months, sometimes with periods of temporary improvement. Patients are often removed from the hospital to save expense and for other reasons. Most of the cases admitted more than once were in the terminal stages of the disease on last admission.

DISTRIBUTION OF DEATHS BY AGE, RACE, AND SEX

ALL RHEUMATIC HEART DISEASE

The age, race, and sex distribution by 5-year age periods of 916 fatal cases of rheumatic heart disease, including 184 deaths from sub-

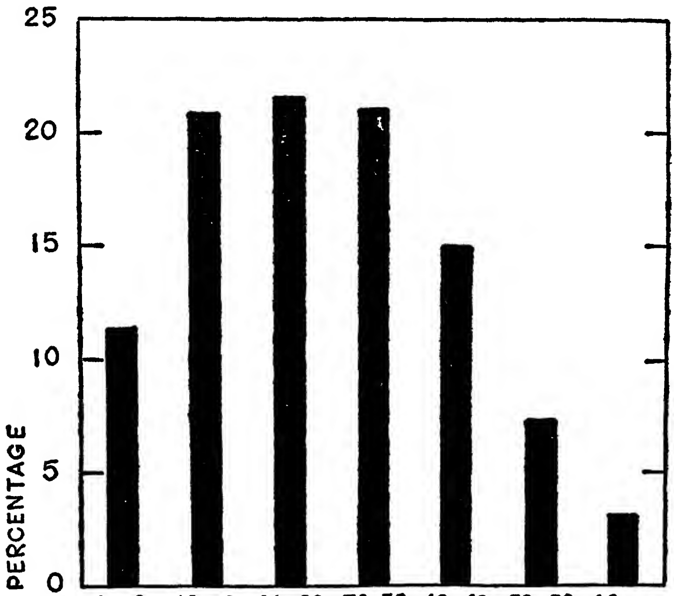

FIGURE 1—Percentage distribution by age decades of 916 fatal cases of rheumatic heart disease, including 184 cases of subacute bacterial endocarditis superimposed on rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

acute bacterial endocarditis superimposed on rheumatic heart disease is shown in table 2, while in figure 1 is shown the distribution of these deaths by age decades.

Mean age.—The mean age at death was 29.4 years and the median age was 28.3 years. The mean age was about the same as that determined by the writer during a study of rheumatic heart disease in Washington (D. C.) hospitals during 1932, where the mean age of 60 fatal cases was 29.0 years (*2*). The mean age of 357 deaths reported by physicians in Philadelphia during 1936 as due to rheumatic heart disease was 36.5 years (*3*). The mean age of 180 of these deaths

which occurred in hospitals approved for interneship by the American Medical Association was 33.4 years. The difference between these figures is probably due to the fact that in the study made of deaths during 1936, children's and other hospitals not approved for interneship were not included.

Coombs (*4*), in Great Britain, found that the age at death among clinical cases was 28.6 years. DeGraff and Lingg (*5*), in a follow-up study of 1,633 cases of rheumatic heart disease, report that the mean age at death of 644 cases was 33 years. Their series was composed largely of patients seen on an adult medical ward and adult cardiac clinic of Bellevue Hospital. This may account for the difference of about 4 years between DeGraff and Lingg's and the present series. Even at the Mayo Clinic, despite the fact that no deaths were included among persons under 10 years of age, Willius (*6*) states that the mean age of 160 fatal cases of rheumatic heart disease was 32 years. In round figures it seems evident that the mean age at death from rheumatic heart disease is approximately 30 years among hospital patients. The mean age is higher by several years among deaths occurring in the city as a whole or outside of hospitals.

Age distribution.—The maximum number of deaths were reported during the 20–29-year age decade, although nearly as many occurred during the 10–19- and 30–39-year age periods (fig. 1). Altogether, over 63 percent occurred during these three age decades.

TABLE 2.—*Number and percentage of deaths in each 5-year age period, mean and median ages at death, according to color and sex of 916 fatal cases of rheumatic heart disease, including 184 fatal cases of subacute bacterial endocarditis superimposed on rheumatic heart disease among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age at death (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	17	1.9	7	1.7	10	2.0	16	2.1	7	2.0	9	2.1	1	0.7	0	0	1	1.2
5–9	86	9.4	43	10.5	43	8.5	69	8.9	36	10.2	33	7.8	17	12.3	7	12.5	10	12.2
10–14	91	9.9	38	9.3	53	10.5	72	9.3	30	8.5	42	9.9	19	13.8	8	14.3	11	13.4
15–19	101	11.0	57	13.9	44	8.7	85	10.9	46	13.0	39	9.2	16	11.6	11	19.6	5	6.1
20–24	99	10.8	38	9.3	61	12.1	83	10.7	31	8.8	52	12.3	16	11.6	7	12.5	9	11.0
25–29	97	10.6	45	11.0	52	10.3	82	10.5	40	11.3	42	9.9	15	10.9	5	8.9	10	12.2
30–34	98	10.7	46	11.2	52	10.3	82	10.5	40	11.3	42	9.9	16	11.6	6	10.7	10	12.2
35–39	94	10.3	32	7.8	62	12.3	84	10.8	30	8.5	54	12.7	10	7.2	2	3.6	8	9.8
40–44	75	8.2	33	8.0	42	8.3	68	8.7	31	8.8	37	8.7	7	5.1	2	3.6	5	6.1
45–49	62	6.8	34	8.3	28	5.5	53	6.8	30	8.5	23	5.4	9	6.5	4	7.1	5	6.1
50–54	37	4.0	7	1.7	30	5.9	31	4.0	6	1.7	25	5.9	6	4.3	1	1.8	5	6.1
55–59	30	3.3	17	4.1	13	2.6	28	3.6	17	4.8	11	2.6	2	1.4	0	0	2	2.4
60–64	15	1.6	6	1.5	9	1.8	11	1.8	5	1.4	9	2.1	1	.7	1	1.8	0	0
65–69	9	1.0	5	1.2	4	.8	7	.9	4	1.1	3	.7	2	1.4	1	1.8	1	1.2
70 and over	5	.5	2	.5	3	.6	4	.5	1	.3	3	.7	1	.7	1	1.8	0	0
Total	916	100	410	100	506	100	778	100	354	100	424	100	138	100	56	100	82	100
Percent of total		100		44.7		55.2		84.9		38.6		46.3		15.1		6.1		8.9
Mean age (years)	29.4		28.9		29.8		29.8		29.3		30.2		27.1		25.8		28.9	
Median age (years)	28.3		27.4		29.0		28.9		28.4		29.4		25.0		21.4		27.5	

The age distribution of deaths in Philadelphia hospitals indicates death at somewhat older age periods than reported by Coombs (*4*), who noted that nearly 31 percent occurred during the second age decade. Rheumatic heart disease may run a more rapidly fatal course in Great Britain than in this country. It is also possible that Coombs noted more deaths during adolescence in his series because he was following cases begun for the most part during childhood. Furthermore, the picture may have changed both in this country and in Great Britain since Coombs' observations were made due to earlier recognition, better treatment, attenuation of rheumatic infection, and possibly other factors. Cohn (*7*), Cohn and Lingg (*8*), Dublin and Lotka (*9*), Emerson (*10*), and the writer (*11*) have commented upon the reduction in heart disease mortality among young persons in the United States during the present century.

Davis and Weiss (*12*), contrary to the experience of the writer, noted that the peak incidence of 226 deaths caused by rheumatic heart disease, including cases of infective endocarditis superimposed on rheumatic heart disease, occurred in the 40–49-year age period. The fact that their series consisted of fatal cases occurring in only one hospital, the Boston City Hospital, instead of from all the hospitals in a large city, may explain the difference in age distribution.

Brenner (*13*) reported that at the Queens Hospital in Birmingham the greatest number of deaths from rheumatic heart disease occurred during the 20–29-year age period with nearly as many in the two decades from 30–49 years and a large number of deaths in the 10–19-year age period.

Race.—Over 15 percent of deaths from rheumatic heart disease in Philadelphia hospitals were among Negroes (table 2). According to the United States Census of 1930, 11.3 percent of the population of Philadelphia consists of colored persons. Owing to their less favorable economic situation, colored persons are more likely to be hospitalized than white persons. For this reason, the slightly higher percentage of deaths from this cause among Negroes than of this race in the general population does not necessarily indicate a higher mortality. On the other hand, it may be possible that Negroes do not avail themselves of hospitalization for this condition to the extent that they do for other diseases.

According to the United States Census the colored population of Philadelphia increased 69 percent during the decade 1920–29. A large proportion of these migrants were relatively healthy young adults who moved North for employment. The facts that if they had had severe heart disease they would not have left the South, and that they did not belong to the age group which is most likely to develop this disease are probably influencing factors in the mortality among this race. Studies of mortality from rheumatic heart disease

in Philadelphia during 1936 (*3*), mortality from heart disease especially among young persons (*5, 7, 9, 14, 15*), and mortality from rheumatic fever (*16, 17*) in the United States, suggest a much higher mortality from rheumatic heart disease among Negroes. It is not improbable that the incidence and mortality from rheumatic heart disease in Philadelphia hospitals will increase among the second and subsequent generations of Negro migrants as the causative factor becomes disseminated among persons often living under extremely unfavorable environmental conditions.

The mean age at death among white persons was 29.8 years, while among colored persons it was 27.1 years. Compared with heart disease in general, and cardiovascular syphilis, hypertensive heart disease, and acute coronary occlusion (*18*) in particular, the mean ages at death were more nearly the same. In most forms of heart disease the mean age at death among colored persons is lower by 8 to 10 years. Except for more male deaths during the second age decade, there were only slight differences in the age distribution. The high percentage of deaths from rheumatic heart disease among colored males aged 10 to 19 years was noted by the writer in a study of rheumatic heart disease mortality from all sources in Philadelphia during 1936 (*3*).

Sex.—Of the 916 fatal cases of rheumatic heart disease, 410, or 44.7 percent, were males and 506, or 55.3 percent, were females. A predominance of females was noted among both white and colored decedents. The larger number of deaths among females is in agreement with the findings of this study dealing with clinical features of rheumatic heart disease in Philadelphia hospitals and with studies of rheumatic heart mortality from all sources in Philadelphia during 1936 (*3*). This is consonant with the findings of a number of writers, especially Coombs (*4*), Brenner (*13*), and Findlay (*19*).

The mean age at death was 28.9 years among males and 29.8 years among females. There was not as much difference as reported by the writer in other series describing deaths from rheumatic heart disease (*2, 3*). There is not as great difference between the sexes in age at death as from heart disease in general (*14*), and particularly from acute coronary occlusion (*18*). This is probably because rheumatic heart disease is an infection, while many other types of heart disease are due to arteriosclerosis and hypertension. The age distribution (table 2) also showed very slight difference according to sex.

Coombs (*4*) indicated that the mean age at death was just under 30 years among males and just under 28 years among females. He believed that females are not only more likely to develop rheumatic heart disease, but that the prognosis is less favorable. In his series 37 percent of deaths among females occurred prior to 20 years of age as compared with 30 percent of the mortality among males. Con-

versely one-seventh of the males as compared with one-eighth of the females survived 40 years of age. Findlay (*19*) also affirmed the view that females are not only more likely to develop rheumatic heart disease, but that it occurs in more severe forms and that it tends to proceed to a fatal issue more rapidly.

Cumulative percentage of deaths by age decades.—According to figure 2, which shows the cumulative percentage of deaths from rheumatic heart disease in Philadelphia hospitals, over 10 percent occur before 10 years of age, over 30 percent by 20 years of age, over 50 percent

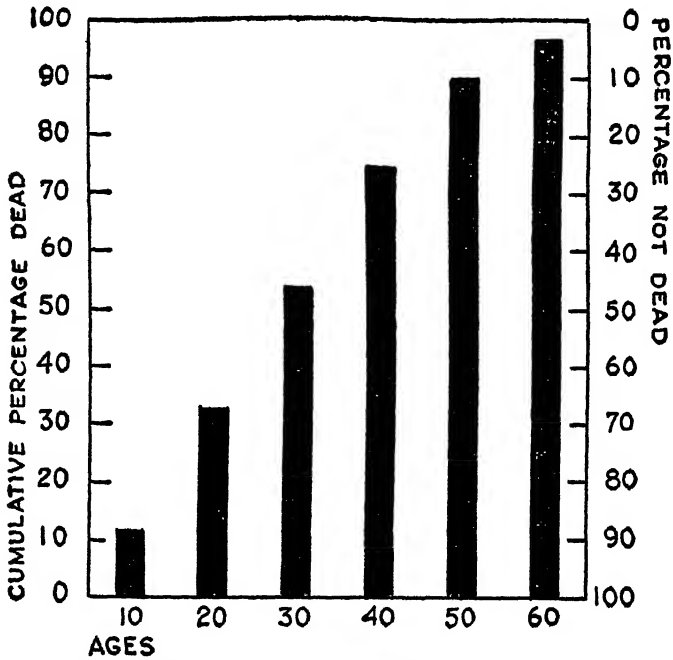

FIGURE 2.—Cumulative percentage of 916 fatal cases of rheumatic heart disease, including subacute bacterial endocarditis superimposed on rheumatic heart disease, occurring either prior to or after various ages among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

by 30 years of age, nearly 75 percent by 40 years of age, nearly 90 percent prior to the fiftieth birthday, while only 3 percent occur among persons past 60 years of age. This is indicative of the importance of this disease during childhood, adolescence, and the most productive years of adult life. Unlike many forms of heart disease, practically all of the deaths from rheumatic heart disease occur before the expiration of a normal span of life.

RHEUMATIC HEART DISEASE EXCLUSIVE OF SUBACUTE BACTERIAL ENDOCARDITIS

Mean ages.—There were 732 deaths from rheumatic heart disease, exclusive of the 184 in which subacute bacterial endocarditis occurred as a complication. The mean age at death was 29.6 years, practically

the same as the mean age at death when subacute bacterial endocarditis is included (table 3). The mean ages at death and the percentage of deaths in each race and sex group were about the same as shown in table 2.

Age distribution.—On the basis of percentage age distribution by decades of life, a smaller proportion of deaths occurred in the 20–29-year age period (figure 3) than when deaths from subacute bacterial endocarditis are included (figure 1), owing to the large number of

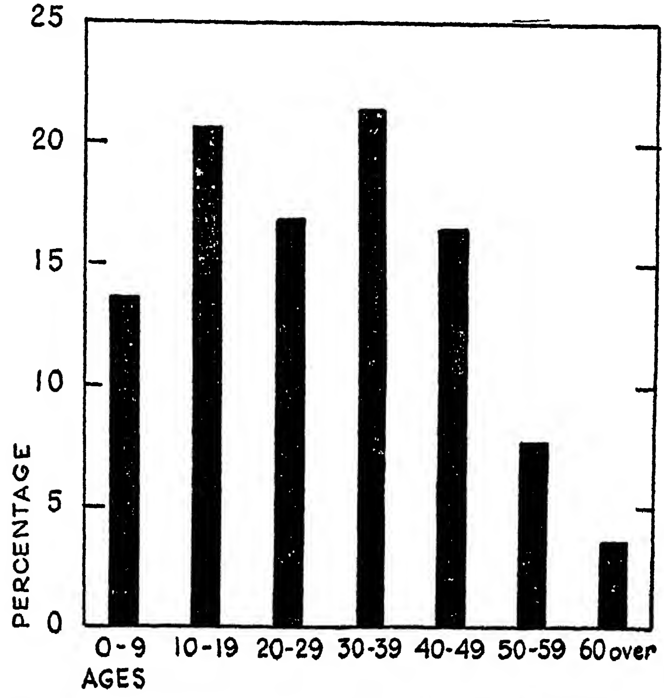

FIGURE 3—Percentage distribution by age decades of 732 fatal cases of rheumatic heart disease, exclusive of subacute bacterial endocarditis, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934

deaths from subacute bacterial endocarditis occurring in the 20–29-year age period. When deaths from this complication are excluded, the curve of deaths by decades from rheumatic heart disease assumes a double hump, with a peak in the 10–19-year age decade due to deaths primarily from rheumatic infection and in the 30–39-year age period due to the combined effects of rheumatic infection, mechanical strain from chronic valvular disease, auricular fibrillation, and the premature superimposition of arteriosclerotic changes which in a diseased heart results in death.

Table 3.—*Number and percentage of deaths in each 5-year period, mean and median ages at death, according to color and sex of 732 fatal cases of rheumatic heart disease, exclusive of subacute bacterial endocarditis superimposed on rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age at death	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	15	2.0	7	2.2	8	2.0	14	2.3	7	2.5	7	2.1	1	0.9	0	0	1	1.4
5-9	84	11.5	41	12.7	43	10.5	67	10.9	34	12.2	33	9.8	17	14.5	7	15.2	10	14.1
10-14	80	10.9	32	9.9	48	11.8	63	10.2	26	9.4	37	11.1	17	14.5	6	13.0	11	15.5
15-19	72	9.8	42	13.0	30	7.4	61	9.9	35	12.6	26	7.7	11	9.4	7	15.2	4	5.6
20-24	59	8.1	23	7.1	36	8.8	50	8.1	18	6.5	32	9.5	9	7.7	5	10.9	4	5.6
25-29	64	8.7	31	9.6	33	8.1	50	8.1	26	9.4	24	7.1	14	12.0	5	10.9	9	12.7
30-34	75	10.2	37	11.4	38	9.3	62	10.1	32	11.5	30	8.9	13	11.1	5	10.9	8	11.3
35-39	81	11.1	24	7.4	57	14.0	71	11.5	22	7.9	49	14.5	10	8.5	2	4.3	8	11.3
40-44	62	8.5	23	7.1	39	9.6	53	9.1	22	7.9	34	10.1	6	5.1	1	2.2	5	7.0
45-49	58	7.9	33	10.2	25	6.1	49	8.0	29	10.4	20	5.9	9	7.7	4	8.7	5	7.0
50-54	29	4.0	3	.9	26	6.4	25	4.1	2	.7	23	6.8	4	3.4	1	2.2	3	4.2
55-59	26	3.6	16	4.9	10	2.5	24	3.9	16	5.8	8	2.4	2	1.7	0	0	2	2.8
60-64	14	1.9	5	1.5	9	2.2	13	2.1	4	1.4	9	2.7	1	.9	1	2.2	0	0
65-69	9	1.2	5	1.5	4	1.0	7	1.1	4	1.4	3	.9	2	1.7	1	2.2	1	1.4
70 and over	4	.5	2	.6	2	.5	3	.5	1	.4	2	.6	1	.9	1	2.2	0	0
Total	732	100	324	100	408	100	615	100	278	100	337	100	117	100	46	100	71	100
Percent of total		100		44.3		55.7		84.0		38.0		46.0		16.0		6.3		9.7
Mean age (years)	29.6		28.9		30.2		30.1		29.2		30.7		27.4		26.7		27.8	
Median age (years)	29.4		27.7		30.9		30.2		28.7		31.6		26.3		23.0		23.1	

Color and sex.—Among the deaths from rheumatic heart disease uncomplicated by subacute bacterial endocarditis, there was very little difference in the age distribution by 5-year age periods according to sex. Table 3 indicates a slightly younger age distribution and younger mean ages at death among Negroes than among white persons. As indicated above, there were only slight differences in the age distribution and mean ages according to color and sex regardless of the

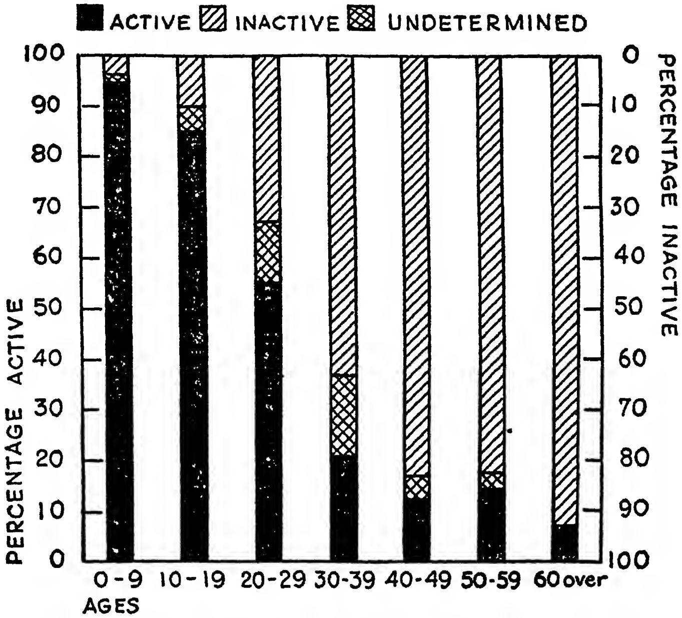

FIGURE 4.—Percentage of fatal cases in each age decade considered as due to active and inactive rheumatic heart disease, and fatal cases in which rheumatic activity was undetermined among 732 deaths from rheumatic heart disease among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

relationship of subacute bacterial endocarditis to rheumatic heart disease.

Factor of rheumatic activity as a cause of death.—The factors most often responsible for death in rheumatic heart disease are rheumatic infection, and circulatory failure due to the mechanical effects of valvular heart disease. As explained in a preceding article dealing with both fatal and nonfatal cases, it is difficult to draw a hard and fast line to determine criteria of rheumatic activity, views concerning which are still in a state of flux.

In this series deaths were considered as due to active rheumatic infection when the patient had rheumatic fever or chorea during or just prior to the final admission or had signs of a systemic infection manifested by fever, leucocytosis, rapid erythrocyte rates, and other signs of infection. This was facilitated in hospitals using the American

TABLE 3.—*Number and percentage of deaths in each 5-year period, mean and median ages at death, according to color and sex of 732 fatal cases of rheumatic heart disease, exclusive of subacute bacterial endocarditis superimposed on rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age at death	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	15	2.0	7	2.2	8	2.0	14	2.3	7	2.5	7	2.1	1	0.9	0	0	1	1.4
5-9	84	11.5	41	12.7	43	10.5	67	10.9	34	12.2	33	9.8	17	14.5	7	15.2	10	14.1
10-14	80	10.9	32	9.9	48	11.8	63	10.2	26	9.4	37	11.1	17	14.5	6	13.0	11	15.5
15-19	72	9.8	42	13.0	30	7.4	61	9.9	35	12.6	26	7.7	11	9.4	7	15.2	4	5.6
20-24	59	8.1	23	7.1	36	8.8	50	8.1	18	6.5	32	9.5	9	7.7	5	10.9	4	5.6
25-29	64	8.7	31	9.6	33	8.1	50	8.1	26	9.4	24	7.1	14	12.0	5	10.9	9	12.7
30-34	75	10.2	37	11.4	38	9.3	62	10.1	32	11.5	30	8.9	13	11.1	5	10.9	8	11.3
35-39	81	11.1	24	7.4	57	14.0	71	11.5	22	7.9	49	14.5	10	8.5	2	4.3	8	11.3
40-44	62	8.5	23	7.1	39	9.6	56	9.1	22	7.9	34	10.1	6	5.1	1	2.2	5	7.0
45-49	58	7.9	33	10.2	25	6.1	49	8.0	29	10.4	20	5.9	9	7.7	4	8.7	5	7.0
50-54	29	4.0	3	.9	26	6.4	25	4.1	2	.7	23	6.8	4	3.4	1	2.2	3	4.2
55-59	26	3.6	16	4.9	10	2.5	24	3.9	16	5.8	8	2.4	2	1.7	0	0	2	2.8
60-64	14	1.9	5	1.5	9	2.2	13	2.1	4	1.4	9	2.7	1	.9	1	2.2	0	0
65-69	9	1.2	5	1.5	4	1.0	7	1.1	4	1.4	3	.9	2	1.7	1	2.2	1	1.4
70 and over	4	.5	2	.6	2	.5	3	.5	1	.4	2	.6	1	.9	1	2.2	0	0
Total	732	100	324	100	408	100	615	100	278	100	337	100	117	100	46	100	71	100
Percent of total		100		44.3		55.7		81.0		38.0		46.0		16.0		6.3		9.7
Mean age (years)	29.6		28.9		30.2		30.1		29.2		30.7		27.4		26.7		27.8	
Median age (years)	29.4		27.7		30.9		30.2		28.7		31.6		26.3		23.0		23.1	

Color and sex.—Among the deaths from rheumatic heart disease uncomplicated by subacute bacterial endocarditis, there was very little difference in the age distribution by 5-year age periods according to sex. Table 3 indicates a slightly younger age distribution and younger mean ages at death among Negroes than among white persons. As indicated above, there were only slight differences in the age distribution and mean ages according to color and sex regardless of the

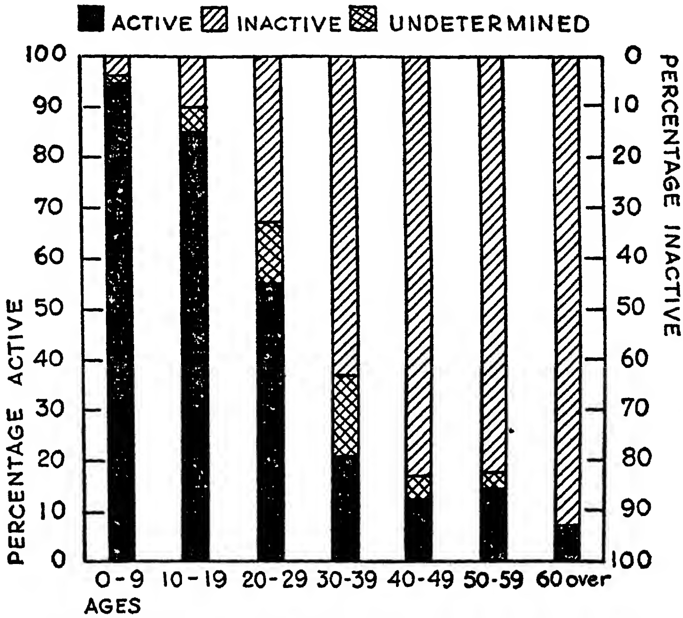

FIGURE 4.—Percentage of fatal cases in each age decade considered as due to active and inactive rheumatic heart disease, and fatal cases in which rheumatic activity was undetermined among 732 deaths from rheumatic heart disease among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

relationship of subacute bacterial endocarditis to rheumatic heart disease.

Factor of rheumatic activity as a cause of death.—The factors most often responsible for death in rheumatic heart disease are rheumatic infection, and circulatory failure due to the mechanical effects of valvular heart disease. As explained in a preceding article dealing with both fatal and nonfatal cases, it is difficult to draw a hard and fast line to determine criteria of rheumatic activity, views concerning which are still in a state of flux.

In this series deaths were considered as due to active rheumatic infection when the patient had rheumatic fever or chorea during or just prior to the final admission or had signs of a systemic infection manifested by fever, leucocytosis, rapid erythrocyte rates, and other signs of infection. This was facilitated in hospitals using the American

Heart Association nomenclature, which includes an estimate of activity among its criteria for diagnosis.

Of the 732 fatal cases of rheumatic heart disease excluding subacute bacterial endocarditis, 344, or 47 percent, were considered as having signs of active rheumatic infection, 329, or 45 percent, as having inactive rheumatic heart disease, while in 57, or 8 percent, it was not possible to estimate rheumatic activity. In figure 4 is shown the age distribution of active and inactive fatal cases according to age decades. Nearly all of the deaths among persons under 10 years of age were due to active rheumatic infection. Of the 374 fatal cases of rheumatic heart disease among persons under 30 years of age, 287, or 76.7 percent, were regarded as having active rheumatic infection. After 30 years of age a considerably smaller percentage of the fatal cases was recognized as having signs of rheumatic activity.

In a measure any estimate of rheumatic activity is somewhat arbitrary. Had this study been made at the present time, especially by a clinician well versed in signs of rheumatic infection or by a well-trained pathologist, it is likely that a higher percentage of active cases would have been found, especially among persons over 30 years of age.

Necropsy studies by Rothschild, Kugel, and Gross (*20*) indicate the presence of signs of rheumatic activity in a large proportion of hearts of persons as old as 40 years dying of rheumatic heart disease. Bland and Jones (*21*) state that fully 80 percent of the fatal cases due to rheumatic heart disease which they have observed result from rheumatic fever, i. e., active rheumatic infection. Most of the fatal cases in their series were among children and young adults.

In stressing the influence of infection in causing or initiating circumstances resulting in death from rheumatic heart disease, there is a danger of unduly minimizing the mechanical effects of damaged valves and myocardium, certain cardiac arrhythmias, especially auricular fibrillation, and the influence of the superimposition of arteriosclerotic changes on previously damaged hearts. Circulatory embarrassment and deaths from these causes, without signs of rheumatic activity, are not infrequent in adult life. Embolic phenomena may result in death in inactive rheumatic heart disease. At all ages the size of the heart is probably the best single prognostic criterion.

It should also be borne in mind that only fatal cases of rheumatic heart disease exclusive of subacute bacterial endocarditis were included. The relationship of rheumatic activity to subacute bacterial endocarditis is a moot point. It is extremely difficult to determine whether signs of systemic infection and even arthritic manifestations occurring during the course of subacute bacterial endocarditis denote rheumatic activity. Proper evaluation, even at necropsy, is often difficult.

Mean ages.—As indicated in table 4, the mean age of deaths from all subacute bacterial endocarditis was 30.5 years. Fulton and Levine (*22*), reporting 111 fatal cases at the Peter Bent Brigham Hospital in Boston, found that the mean age at death was 32.2 years.

The mean age at death from subacute bacterial endocarditis superimposed on rheumatic heart disease was 28 5 years and for subacute bacterial endocarditis not engrafted on rheumatic heart disease, 33.7 years. It is possible that patients may have forgotten rheumatic episodes occurring during childhood or youth, and were consequently placed in the nonrheumatic group. This does not seem likely to any great extent since a similar difference in the mean ages at death was noted among cases in which diagnosis was confirmed at necropsy.

TABLE 4.—*Number and percentage of deaths by age decades, mean and median ages at death of 288 fatal cases of subacute bacterial endocarditis among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age group (years)	All subacute bacterial endocarditis		Subacute bacterial endocarditis on rheumatic heart disease		Subacute bacterial endocarditis not on rheumatic heart disease	
	Number	Percent	Number	Percent	Number	Percent
Under 10	8	2 8	4	2 2	4	3 8
10–19	58	20 2	40	21 8	18	17 3
20–29	99	34 4	73	39 6	26	25 0
30–39	53	18 4	36	19 6	17	16 3
40–49	40	13 8	17	9 3	23	22 2
50–59	25	8 7	12	6 5	13	12 5
60 and over	5	1 7	2	1 1	3	2 9
Total	288	100	184	100	104	100
Mean age (years)	30 5		28 5		33 7	
Median age (years)	27 9		26 6		31 5	

Age distribution.—The age distribution of 288 deaths from subacute bacterial endocarditis, 184 of which were superimposed on rheumatic heart disease, while 104 were apparently not superimposed on this condition, is shown in table 4 and figure 5. The age distribution for all forms of subacute bacterial endocarditis indicates that the peak incidence, 34.4 percent, occurs during the 20–29-year age period. Few deaths occurred among persons younger than 10 years of age or older than 60 years.

The age distribution of these 288 fatal cases closely approximates the age distribution reported by a number of writers, including Horder (*23*), Blumer (*24*), Clawson (*25*), Thayer (*26*), Brenner (*13*), Morrison (*27*), and Fulton and Levine (*22*). With the exception of Clawson, who reported an equal number of cases during the third and fourth age decades, all noted that the highest incidence occurs during the 20–29-year age decade. All these students of this problem, with the possible exception of Thayer, observed that subacute bacterial

endocarditis is infrequent during the age period under 10 years and among persons over 60 years of age.

Considerably more deaths occurred during the 40–49-year age period from subacute bacterial endocarditis apparently not engrafted on rheumatic heart disease than from this disease occurring as a com-

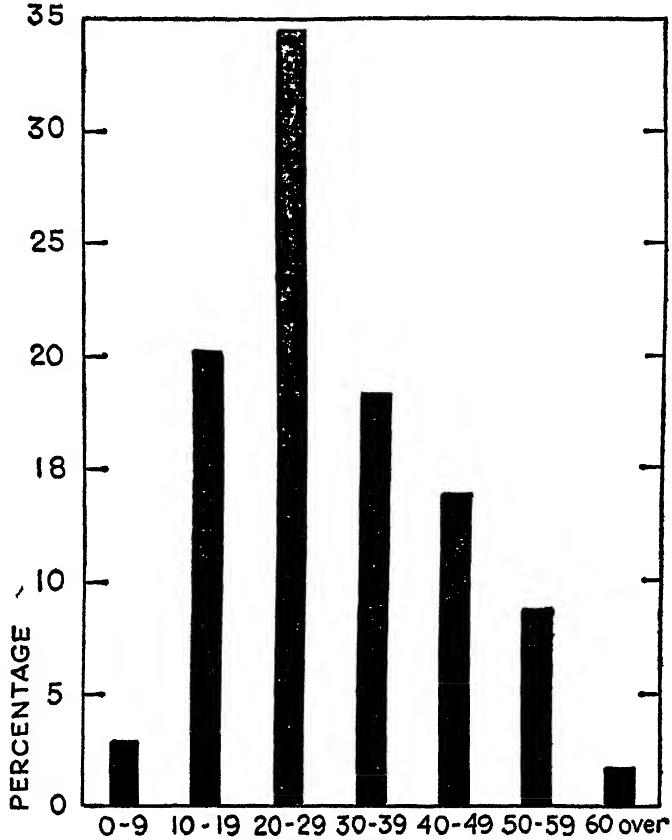

FIGURE 5.—Percentage distribution by age decades of 288 fatal cases of subacute bacterial endocarditis, including 184 cases superimposed on rheumatic heart disease and 104 apparently not superimposed on rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

plication of rheumatic heart disease. As explained above, this also occurred in the necropsy cases and probably is not due to failure of a patient to remember rheumatic episodes.

Sex.—There were 143 deaths among males and 145 among females, an almost equal distribution. Of the 184 fatal cases of subacute bacterial endocarditis superimposed on rheumatic heart disease, 86, or 46.7 percent, were males, while 98, or 53.3 percent, were females. Among 104 deaths from subacute bacterial endocarditis in which a

relationship to rheumatic heart disease was not definitely determined, 57, or 54.8 percent, were males, and 47, or 45.2 percent, were females.

Most writers report that subacute bacterial endocarditis is considerably more common among males than females. Fulton and Levine (*22*) noted that over 60 percent of 111 cases seen at the Peter Bent Brigham Hospital during 1913–30 were males. Morrison (*27*) noted that 63.4 percent of 145 cases of subacute bacterial endocarditis at the Massachusetts General Hospital were males. Clawson (*25*) observed that 75 percent of 72 cases of subacute bacterial endocarditis examined post mortem were males. Thayer (*26*) noted that 67.8 percent of 114 cases of streptococcus (acute and subacute) endocarditis seen at the Johns Hopkins Hospital were males. Blumer (*24*), in a series of 328 cases, noted that 60 percent were males. Horder (*23*), however, noted that the number of cases among males and females was almost equally divided. Among 150 cases of infective endocarditis seen mostly at the St. Bartholomew's Hospital in London, 79 were males and 71 females. Cabot (*28*) reported 93 males and 87 females among 180 cases of acute and subacute bacterial endocarditis examined post mortem at the Massachusetts General Hospital during 1896–1919, an almost equal distribution. It is likely that the distribution by sex is more nearly equal than some writers have reported. In a series such as this any element of selection because of peculiarities in the composition of the patient load is minimized owing to the large number and variety of hospitals under study.

Among females, 41.4 percent of deaths occurred during the 20–29-year age period, while only 27.3 percent of deaths among males occurred in this age decade. This ratio was uninfluenced by the relationship of subacute bacterial endocarditis to rheumatic heart disease. The high incidence of deaths from subacute bacterial endocarditis among females aged 20–29 years may be due to foci of infection in the pelvic cavity.

Race.—Of the 288 deaths from subacute bacterial endocarditis, 258, or 89.6 percent, were among white persons, and 30, or 10.4 percent, were among colored persons. The ratio of white to colored fatal cases is not greatly influenced by the relationship of subacute bacterial endocarditis to rheumatic heart disease. Thayer (*26*) found that 90, or 78.9 percent, of 114 cases of streptococcal endocarditis at the Johns Hopkins Hospital in Baltimore were among white persons and 24, or 21.1 percent, among Negroes. It is doubtful whether race plays an important role in the etiology of subacute bacterial endocarditis. Such differences as may exist are probably due to differences in the incidence of rheumatic heart disease. This is probably more dependent on geographic locality than upon any inherent lack of susceptibility by Negroes.

NECROPSY CASES

All rheumatic heart disease.—Of the 916 deaths from rheumatic heart disease, necropsies were obtained on 214 cases, or 23.4 percent. The age distribution, mean ages at death, and race and sex distribution of necropsy cases (table 5) do not differ greatly from the entire series of 916 fatal cases of rheumatic heart disease in Philadelphia hospitals during the period under study. A somewhat younger distribution by age decades was indicated among males than females.

The mean ages at death among necropsy cases was 28.9 years. Coombs (*4*) in Great Britain found that the mean age at death among 98 necropsy cases was 28.2 years, a very close approximation to the mean age in this larger series of 214 deaths. The age distribution in Coombs' series differed somewhat from this series. According to Coombs, 8.1 percent occurred in the age decade under 10 years, 30.6 percent in the 10–19-year age decade, 2.4 percent in the 20–29-year age decade, 14.2 percent in the 30–39-year age decade, 13.2 percent in the 40–49-year age decade, and 9.1 percent among persons over 50 years of age. Coombs' series consisted in the main of cases of rheumatic heart disease followed from childhood, and was therefore not entirely comparable to a series consisting of all fatal cases in the hospitals of a large city during a 5-year period. It is to be expected that his series would contain more cases in which death occurred in early life. Furthermore, his series contained very few cases of rheumatic heart disease complicated by subacute bacterial endocarditis.

TABLE 5.—*Number and percentage of deaths by age decades, mean and median ages at death, according to color and sex, of 214 necropsy cases of rheumatic heart disease, including 81 of subacute bacterial endocarditis superimposed on rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age group (years)	Total						White						Colored		
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes	Male	Female
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Number	Number
Under 10	24	11.6	11	11.1	13	12.1	19	10.9	10	11.8	9	10.1	5	1	4
10–19	43	20.9	28	28.3	15	14.0	35	20.1	21	24.7	14	15.7	8	7	1
20–29	46	22.3	20	20.2	26	24.3	37	21.3	17	20.0	20	22.5	9	3	6
30–39	37	18.0	18	18.2	19	17.8	34	19.5	17	20.0	17	19.1	3	1	2
40–49	34	16.5	14	14.1	20	18.7	28	16.1	12	14.1	16	18.0	6	2	4
50–59	13	6.3	3	3.0	10	9.3	12	6.9	3	3.5	9	10.1	1	0	1
60 and over	9	4.4	5	5.1	4	3.7	9	5.2	5	5.9	4	4.5	0	0	0
Age unknown	8	-----	2	-----	6	-----	5	-----	0	-----	5	-----	3	2	1
Total	214	100	101	100	113	100	179	100	85	100	94	100	35	16	19
Percent of total	100	-----	47.2	-----	52.8	-----	83.6	-----	39.7	-----	43.9	-----	16.4	7.5	8.9
Mean age (years)	28.9	-----	27.2	-----	30.6	-----	29.8	-----	28.1	-----	31.4	-----	24.5	21.6	26.7
Median age (years)	27.8	-----	25.3	-----	29.8	-----	28.9	-----	26.8	-----	30.8	-----	22.2	18.0	26.7

Rheumatic heart disease, exclusive of subacute bacterial endocarditis superimposed on rheumatic heart disease.—Necropsies were obtained on 133, or 18.2 percent, of 732 fatal cases of rheumatic heart disease not complicated by subacute bacterial endocarditis (table 6). The mean age at death was 28.9 years, the same as for rheumatic heart disease including subacute bacterial endocarditis when occurring as a complication (compare tables 5 and 6). The percentage distribution by race and sex were quite similar. The age distribution by decades of life closely approximates that shown in table 3 for a larger series based on 732 fatal cases. There is a greater number of males than females in the total number of fatal cases, while in the necropsy series the sex distribution is about equal. This is probably due to greater difficulty in obtaining permission for post mortem examinations on females.

Comparing tables 5 and 6, it is noted that the greatest number of necropsies among cases of uncomplicated rheumatic heart disease occurs during the 10–19-year age decade; when necropsy cases of rheumatic heart disease complicated by subacute bacterial endocarditis are included the peak incidence is in the 20–29-year age period. This is in agreement with Coombs' (*4*) findings mentioned above. Cabot (*28*), on the other hand, noted that the greatest number of cases at the Massachusetts General Hospital occurred during the 30–39-year age decade. The age distribution in Cabot's series is doubtless influenced by the predominantly adult age distribution of patients at the Massachusetts General Hospital.

TABLE 6.—*Number and percentage of deaths in each age decade, mean and median ages at death, according to color and sex, of 133 necropsy cases of rheumatic heart disease uncomplicated by subacute bacterial endocarditis among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age group (years)	Total						White						Colored		
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes	Male	Female
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Number	Number
Under 10	20	16.0	8	12.7	12	19.3	16	15.2	8	14.5	8	16.0	4	0	4
10–19	29	23.2	21	33.3	8	12.9	23	21.9	16	29.1	7	14.0	6	5	1
20–29	17	13.6	9	14.3	8	12.9	12	11.4	8	14.5	4	8.0	5	1	4
30–39	17	13.6	9	14.3	8	12.9	17	16.2	9	16.4	8	16.0	0	0	0
40–49	28	22.4	11	17.5	17	27.4	23	21.9	9	16.4	14	28.0	5	2	3
50–59	7	5.6	0	0	7	11.3	7	6.7	0	0	7	14.0	0	0	0
60 and over	7	5.6	5	7.9	2	3.2	7	6.7	5	9.1	2	4.0	0	0	0
Age unknown	8		2		6		5	-	0	-	5		3	2	1
Total	133	100	65	100	68	100	110	100	55	100	55	100	23	10	13
Percent of total	100	----	48.9	---	51.1	-	82.7	----	41.3	-----	41.3	----	17.3	7.5	9.8
Mean age (years)	28.9	- -	27.0	---	30.9	-	30.1	----	27.5	----	33.0	----	22.5	23.3	22.0
Median age (years)	27.9	----	22.8	--	33.8	-	30.9	----	24.4	- ---	37.5	----	20.0	18.0	22.5

Subacute bacterial endocarditis.—Necropsies were obtained on 118, or 41.0 percent, of 288 fatal cases of subacute bacterial endocarditis. The mean age at death was 31.4 years (table 7). The mean age and age distribution by decades of life are not unlike those shown in table

4 and figure 5, based on all 288 fatal cases of subacute bacterial endocarditis. In both of these tables the peak incidence is in the 20–29-year age decade. The mean age at death was 29.2 years among 81 fatal cases of subacute bacterial endocarditis superimposed on rheumatic heart disease, while it was 37.5 years among 37 necropsy cases in which a relationship to rheumatic heart disease was not evident. Laws and Levine (*29*), in a series of 43 cases of rheumatic heart disease dying of subacute bacterial endocarditis, found that the mean age at death was 38.2 years.

TABLE 7.—*Number and percentage of deaths in each age decade, mean and median ages at death of 118 necropsy cases of subacute bacterial endocarditis, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age group (years)	All subacute bacterial endocarditis		Subacute bacterial endocarditis on rheumatic heart disease		Subacute bacterial endocarditis not on rheumatic heart disease	
	Number	Percent	Number	Percent	Number	Percent
Under 10	7	5.9	4	4.9	3	8.1
10–19	18	15.2	14	17.3	4	10.8
20–29	37	31.4	29	35.8	8	21.6
30–39	25	21.2	20	24.7	5	13.5
40–49	13	11.0	5	6.2	8	21.6
50–59	15	12.7	7	8.6	8	21.6
60 and over	3	2.5	2	2.5	1	2.7
Total	118	100	81	100	37	100
Mean age (years)	31.4		29.2		37.5	
Median age (years)	29.2		27.8		37.0	

On the basis of necropsy studies, 68.6 percent of the cases of subacute bacterial endocarditis appeared to have a definite rheumatic background.

COUNTRY OF BIRTH

Death certificates were obtained on 859 fatal cases of rheumatic heart disease, including 184 cases in which subacute bacterial endocarditis occurred as a complication of rheumatic heart disease. Of these 859 deaths, 127 were among colored persons, practically all of whom presumably were born in the United States. The countries of birth of 732 fatal cases of rheumatic heart disease among white persons were:

	Number	*Percent*
United States	583	79.6
Russia	44	6.1
Italy	28	3.8
Ireland	12	1.6
Poland	11	1.5
Austria-Hungary	11	1.5
England, Scotland, and Wales	8	1.1
Germany	6	0.8
Other countries	24	3.3
Unknown	5	0.7
	732	100.0

Definite conclusions cannot be drawn concerning the influence of nationality on a disease in which the mean age at death is less than 30 years of age, especially in view of the marked reduction in immigration during recent years. There has been comparatively little immigration from some of these countries, such as Germany, since the World War of 1914–18. The writer (*18*) recently invited attention to the influence of immigration on deaths from acute coronary occlusion. Mortality from that disease tended to be higher among persons born in countries with the greatest immigration prior to 1900. In rheumatic heart disease the converse prevails.

For a more detailed consideration of immigration, reference is made to the United States Census of 1930 (*30*). Thompson and Britten (*31*) have also pointed out that among foreign born persons age varies a great deal with country of birth by reason of the fact that English, German, Irish, and northern European immigrants to the United States came much earlier than the Italian, Polish, and eastern and southern European immigrants. This may account in a large measure for the relatively large number of deaths from rheumatic heart disease among persons born in Italy and Russia, countries from which there has been the greatest immigration since the World War of 1914–18.

DEATHS ACCORDING TO RACIAL STRAINS

Racial strains of 732 white persons who died from rheumatic heart disease were determined. Decedents were considered as of old American stock only when both parents were native born. When one or both parents were foreign born the decedent was considered of foreign strain. Where both parents were foreign born but of different nationalities the racial strain was based arbitrarily on the nationality of the father. From these data mean annual specific rates of deaths in hospitals were computed, based on the United States Census of 1930 (table 8).

According to table 8 the death rate in hospitals is higher among white persons of old American stock than among any of the racial strains of foreign extraction. Decedents of Russian, Italian, and Austro-Hungarian racial strains occupy an intermediary position, while the lowest mortality from rheumatic heart disease in hospitals was noted among persons of British, Irish, Polish, and German birth or extraction.

The period of the greatest influx of immigration also influences this group, but to a less extent than among deaths of persons born in foreign countries. Most of the foreign strain decedents in table 8 belonged to the second generation following immigration. Proximity to hospitals and the relative readiness with which various racial groups avail themselves of hospital facilities also play a part.

TABLE 8.—*Specific death rates per 100,000 population from rheumatic heart disease of 732 fatal cases among white persons admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on racial strains. When the decedent or one parent was foreign born, the decedent was considered of a foreign strain. When both parents were foreign born, but of different nationalities, the decedent was arbitrarily considered as belonging to national strain of father. Based on information obtained from death certificates*

Country	Persons of various racial strains residing in Philadelphia according to U. S. Census of 1930	Deaths from rheumatic heart disease	Mean annual rate per 100,000 population
United States	371,974	263	14.1
Russia	176,088	89	10.1
Germany	131,328	32	4.9
Ireland	184,336	73	7.9
Italy	182,368	93	10.2
England, Scotland, and Wales	98,757	36	7.3
Austria-Hungary	40,241	22	10.9
Poland	77,994	21	5.4
Unknown	------	69	------
Other countries	------	34	------
Total	------	732	------

The low incidence of deaths from rheumatic heart disease among persons of German birth or extraction is probably due to a better economic status than that of most persons of foreign birth or extraction. Most of the immigration from Germany occurred prior to the World War of 1914–18 and as a consequence they have become better established economically. As a result, they are more likely to be attended by private physicians than admitted to the wards of general and children's hospitals. Similarly it is quite likely that a lower incidence of rheumatic conditions actually obtains, since rheumatic fever is more prone to attack persons in the lower economic brackets.

OCCUPATION OF DECEDENTS

Review of 860 death certificates of fatal cases of rheumatic heart disease, including subacute bacterial endocarditis superimposed on rheumatic heart disease, indicated that over 25 percent of the decedents belonged to the preschool or school groups (table 9). Of the 331 white males only 10, or 3.0 percent, belonged to the professional class. Among white males, 125, or 50.6 percent, of the 247 decedents not in the preschool or school groups were listed as skilled, semiskilled, or unskilled laborers. This is probably an underestimate, since many persons whose occupational status was listed as unknown, retired, or unemployed belonged in the laboring classes. While these findings are by no means conclusive, they give additional support to the widely accepted view that rheumatic heart disease is essentially a disease of the wage-earning class.

TABLE 9.—*Number of decedents in each occupational group by color and sex among 860 fatal cases of rheumatic heart disease, including subacute bacterial endocarditis superimposed on rheumatic heart disease, in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on information from death certificates*

Occupational group	Total						White						Colored		
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes, number	Male, number	Female, number
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent			
Preschool	31	3.6	13	3.4	18	3.8	23	3.8	13	3.9	15	3.7	3	0	3
School	196	22.8	93	24.3	103	21.6	155	21.1	71	21.4	84	20.9	41	22	19
Housewife—home	237	27.5	0	0	237	49.7	202	27.6	0	0	202	50.2	35	0	35
Professional	21	2.4	11	2.9	10	2.1	20	2.7	10	3.0	10	2.5	1	1	0
Merchant	21	2.4	20	5.2	1	.2	21	2.9	20	6.0	1	.2	0	0	0
Clerks-salesmen	44	5.1	36	9.4	8	1.7	44	6.0	36	10.9	8	2.0	0	0	0
Skilled labor	101	11.7	88	23.0	13	2.7	97	13.2	85	25.7	12	3.0	4	3	1
Semiskilled and unskilled labor	87	10.2	58	15.1	29	6.1	57	7.8	40	12.1	17	4.2	30	18	12
Farmers	4	.5	4	1.0	0	0	3	.4	3	.9	0	0	1	1	0
Occupation unknown	65	7.6	34	8.9	31	6.5	56	7.6	30	9.1	26	6.5	9	4	5
No occupation, retired, unemployed	53	6.2	26	6.8	27	5.7	50	6.8	23	6.9	27	6.7	3	3	0
Total	860	100	383	100	477	100	733	100	331	100	402	100	127	52	75

The relationship of occupation to rheumatic heart disease is difficult to interpret. Since this disease for the most part dates back to childhood or adolescence, its victims are often restricted from engaging in arduous occupations. To a certain extent they are more likely to pursue professional or clerical occupations. Consequently, because of this factor of selection, there are probably more persons with rheumatic heart disease engaged in sedentary occupations than their social status would normally indicate.

YEARLY DISTRIBUTION OF DEATHS

The number of deaths showed considerable increase during the first three years of the study (table 10), probably owing to better recognition. During 1932–34 the number of deaths from rheumatic heart disease, including subacute bacterial endocarditis superimposed on rheumatic heart disease, and the percentage of fatal cases among hospital admissions from all causes remained fairly constant. Based on these figures there are about 200 deaths each year in Philadelphia hospitals due to rheumatic heart disease. Of these 200 deaths, about 165 are due primarily to rheumatic heart disease and 35 to subacute bacterial endocarditis superimposed on rheumatic heart disease. About 0.10 percent of admissions from all causes to Philadelphia hospitals succumb to rheumatic heart disease.

TABLE 10.—*Distribution by years under study of 916 fatal cases of rheumatic heart disease, including subacute bacterial endocarditis superimposed on rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Year	Number of deaths	Percentage of deaths each year	Admissions from all causes	Percentage of fatal cases among admissions from all causes
1930	138	15.1	176,521	0.078
1931	154	16.8	169,045	.091
1932	199	21.7	169,803	.117
1933	194	21.2	172,121	.113
1934	214	23.3	162,993	.131
1935	3	.3		
Unknown	14	1.5		
Total	916	100.0	850,423	.108

HISTORY OF RHEUMATIC INFECTION

Definite histories of previous rheumatic infection or an indication of rheumatic fever or chorea during final admission were noted in 606, or 66.2 percent, of 916 fatal cases of rheumatic heart disease, including the cases with subacute bacterial endocarditis as a complication of rheumatic heart disease. Only histories of rheumatic fever, chorea, or both of these conditions were considered sufficiently definite to indicate previous rheumatic infection. Histories of other conditions which sometimes seem to result in rheumatic heart disease, such as growing pains or tonsillitis, were not included. Among these 916 fatal cases, a history of rheumatic fever alone was obtained in 526, or 57.4 percent. Histories of both rheumatic fever and chorea were obtained in 28 fatal cases, or 3.1 percent. Altogether a history of rheumatic fever was indicated in 554, or 60.5 percent.

A history of Sydenham's chorea without rheumatic fever was obtained in 67, or 7.3 percent. Including the 28 cases in which a history of both rheumatic fever and chorea was mentioned, chorea was indicated in 95 instances, or 10.4 percent. The high incidence of chorea without rheumatic fever according to these histories is probably due in no small measure to a failure of patients to remember evanescent rheumatic episodes occurring during childhood, while a history of chorea is usually indelibly fixed in a patient's memory. This should not be interpreted as an attempt to deprecate the importance of chorea as a rheumatic episode. Next to rheumatic fever, it is the most frequent clinical entity encountered with rheumatic carditis. The association of this triad of diseases occurs with too great frequency to be dismissed casually. In this series a history of Sydenham's chorea without rheumatic fever occurred about one-eighth as frequently as rheumatic fever. Including instances in which there was a history of chorea and rheumatic fever, chorea occurred about one-fifth as frequently as rheumatic fever in the histories of these fatal cases.

AGE OF ONSET OF RHEUMATIC INFECTION

According to table 11, the onset of rheumatic infection occurred before 20 years of age in 78.1 percent and before 30 years of age in 91.2 percent of 542 fatal cases in which the age at onset was indicated in the clinical histories. This is probably an underestimate of the onset of rheumatic infection prior to these ages. Since rheumatic fever in childhood is often not attended by severe joint manifestations, the first episode may have been forgotten. Furthermore, 64 patients gave a history of rheumatic infections but did not state the exact age. Most of these were either relatively young or middle-aged persons who stated that the disease occurred "during childhood," the clear implication being that it developed prior to 20 years of age.

Reference is made to Part II of this series of articles, dealing with clinical manifestations of rheumatic heart disease in Philadelphia hospitals. The distribution of age at onset of rheumatic infection as obtained from the clinical histories of fatal cases of rheumatic heart disease follows the same general pattern as the age at onset of rheumatic fever among all cases of rheumatic heart disease.

TABLE 11.—*Number and percentage distribution by 5-year age periods of onset of rheumatic infection among 606 fatal cases with definite history of rheumatic fever or chorea among 916 fatal cases of rheumatic heart disease, including subacute bacterial endocarditis as a complicating factor, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age period (years)	Number	Percent	Cumulative percentage	Age period (years)	Number	Percent	Cumulative percentage
Under 5	26	4.8	4.8	35-39	14	2.6	97.3
5-9	158	29.2	34.0	40-44	12	2.2	99.5
10-14	148	27.3	61.3	45-49	1	.2	99.7
15-19	91	16.8	78.1	50 and over	2	.4	100.0
20-24	38	7.0	85.1	Age unknown	64		
25-29	33	6.1	91.2				
30-34	19	3.5	94.7	Total	606	100	

NOTE.—Mean age at onset 14.7 years; mode, 9.3 years.

Age at onset of rheumatic infection in this series is somewhat younger than reported at the Mayo Clinic. Willius (*6*) in a series of 160 fatal cases, none of which were less than 10 years of age at death, noted that the first attack of rheumatic infection occurred before 20 years of age in 64 percent of cases and before 30 years of age in 85 percent of cases. The peak incidence of the onset of rheumatic infection, according to histories at the Mayo Clinic, occurred in the 10–19-year age period, during which 46 percent developed. The differences in these series, which are not great, are probably explained on the basis of the selected clientele of the Mayo Clinic.

Davis and Weiss (*33*) in a series of 113 fatal cases at the Boston City Hospital obtained histories of onset of rheumatic fever in the 0–10-year age period in 27.4 percent, in the 11–20-year age group in

40.8 percent, in the 21–30-year age group in 14.1 percent, in the 31–40-year age group in 12.4 percent, and among persons over 40 years of age in 5.3 percent. This age distribution of onset of rheumatic infection, while indicating an onset among somewhat older persons, is not dissimilar to the age distribution in table 11.

In a series of 1,633 fatal cases of rheumatic heart disease, DeGraff and Lingg (*5*) found that the greatest incidence of initial rheumatic infections, 39.6 percent, occurred during the 10–19-year age decade. Infection occurred before 30 years of age in 84.7 percent, and in 95.6 percent by 40 years of age. Taking into consideration certain deaths from rheumatic heart disease occurring among persons of an age not included in their series, these writers place the mean age at onset at 16.8 years, the median age at onset at 14 years and the mode at 9–11 years, closer to that of 8 years as reported by Wilson, Lingg, and Croxford (*32*).

INTERVAL BETWEEN RHEUMATIC INFECTION AND DEATH

The mean age at onset of rheumatic infection according to the clinical histories of these 606 cases was 14.7 years. The mean age at death was 28 1 years. On this basis, the average interval between onset of rheumatic infection and death is 13.4 years. Willius (*6*) noted that the mean duration of rheumatic heart disease among 160 fatal cases at the Mayo Clinic was 14 years. DeGraff and Lingg (*5*) place the mean duration of rheumatic heart disease at 15 years.

The interval between the onset of rheumatic infection, according to the clinical history, and the age at death according to age decades is shown in table 12. On the basis of clinical histories, 73, or 13.5 percent of cases giving age at onset, succumbed within 1 year after the onset of rheumatic fever or chorea. Nearly 32 percent of deaths occurred in less than 5 years after the onset of rheumatic infection and over 48 percent in less than 10 years. On the other hand, nearly 11 percent survived 30 years from the onset of rheumatic infection.

TABLE 12.—*Interval between age at onset of rheumatic infections as indicated in the clinical history and age at death according to age decades among 606 fatal cases of rheumatic heart disease admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Duration (years)	Deaths at all ages		Age decade at death (years)						
	Number	Percent	Under 10	10–19	20–29	30–39	40–49	50–59	60 and over
Less than 1 year	73	13 5	37	19	9	4	4	-------	-------
1	24	4 4	5	10	3	4	1	1	-------
2	21	3 9	12	6	2	1	-------	-------	-------
3	32	5 0	4	17	4	5	2	-------	-------
4	22	4 1	2	11	7	1	1	-------	-------
5	19	3 5	1	9	5	4	-------	-------	-------
6	19	3 5	1	8	5	2	3	-------	-------
7	24	4 4	1	12	4	4	2	1	-------
8	13	2 4	-------	6	5	2	-------	-------	-------
9	15	2 8	-------	7	6	-------	-------	2	-------
10-14	81	14 9	-------	17	40	15	7	2	-------
15-19	70	12 9	-------	3	33	23	8	3	-------
20-24	33	6 1	-------	-------	3	16	9	5	-------
25-29	37	6 8	------	------	------	22	12	2	1
30 and over	59	10 9	------	----	-	3	31	16	9
Age at onset unknown	64	-------	3	11	15	10	13	7	5
Total	606	100	66	136	141	116	93	39	15
Percent of total	-------	100	10 9	22 4	23 3	19.1	15.3	6 4	2.5

These figures agree quite closely with those of Davis and Weiss (*33*), who noted that 30.1 percent of 83 necropsy cases died within 5 years after the onset of rheumatic fever and 42.1 percent within 10 years. These statistics should not be interpreted as indicating the duration of life following attacks of rheumatic fever or chorea, but rather that a large proportion of deaths from rheumatic heart disease occur within a few years after the onset of rheumatic infection. The figures in table 12 do not present as unfavorable a prognosis as those of some other writers seem to indicate. Bland and Jones (*21*) found that nearly half (47 percent) of the deaths occurred after durations of less than 3 years and that nearly two-thirds (62 percent) occurred within 5 years. Ash (*34*) found that 40.5 percent of 121 children with rheumatic infection were dead within 10 years after the onset. Both of these series were limited exclusively to cases developing in childhood and adolescence.

DEATH DURING FIRST ATTACK OF RHEUMATIC FEVER

During the 5 years under study 862 patients were admitted during a first attack of rheumatic fever. According to table 13, 30 cases, or 3.5 percent, terminated fatally. In addition, there were 9 other fatal cases in which no mention was made in the clinical record of a previous attack. On this basis, 39 patients, or 4.5 percent, succumbed during a first attack of rheumatic fever. Of the 283 first attacks of rheumatic fever during the age decade under 10 years, 7.1 percent resulted fatally. During the 10–19-year age decade 2.3 per-

cent of 306 patients admitted during a first attack died. Among the older age groups smaller percentages of case fatalities obtained.

There were only 4 fatalities during first attacks of chorea; of these 2 were diagnosed as also having rheumatic fever. In 3 other fatal cases of chorea no previous attack was indicated.

TABLE 13.—*Number and percentages of deaths during first attack of rheumatic fever by age decades in Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age decade (years)	First attacks	Deaths during first attacks	
	Number	Number	Percent
Under 10	283	20	7.1
10–19	306	7	2.3
20–29	147	1	.7
30–39	81	1	1.2
40 and over	42	1	2.4
Age unknown	3	0	0
Total	862	30	3.5

In addition to these, there were 19 patients, 14 in the age period under 10 years and 5 in the 10–19-year age period who died during a first attack of fulminating rheumatic carditis. These patients gave neither histories nor signs of rheumatic fever or chorea during their stay in the hospital. If these are included, the initial case fatality rate is somewhat higher. It was not considered advisable to attempt to determine the number of instances of initial rheumatic infections, since many patients with well-developed rheumatic heart disease have no histories of previous rheumatic infection.

Atwater (*17*) in a composite series of 21,608 cases of rheumatic fever collected from 9 sources noted that the case fatality rate was 1.74 percent. Since this figure was based on cases reported in the literature prior to 1900 and for the most part by European writers, it is doubtful whether this percentage would apply in the United States at the present time. Swift (*35*) places the case fatality rate at 4 percent. Ash (*36*), in Philadelphia, recently noted that 5.2 percent of 521 patients died during an initial attack of rheumatic infection. Her series was confined exclusively to patients at the Children's Hospital. In the present series 4.6 percent of 582 patients under 20 years of age admitted during a first attack of rheumatic fever died (table 13). This is in substantial agreement with Ash. The slight difference is probably due to a larger number of cases in this series with onset in the 10–19-year age period.

MISCELLANEOUS DATA

Nonresident deaths.—Review of 860 death certificates indicated that 750, or 87.2 percent, of the decedents from rheumatic heart disease including subacute bacterial endocarditis were residents of Philadelphia, while 80, or 9.3 percent, were nonresidents. The residence of

30, or 3.5 percent, was not listed on the death certificates. Despite the preeminence of Philadelphia as a medical center, rheumatic heart disease is distinctly a local problem. To a slight extent this is due to the inclusion of deaths from rheumatic heart disease complicated by subacute bacterial endocarditis, since of 685 deaths from rheumatic heart disease without this complication only 8.3 percent were nonresidents. Of the 275 deaths from subacute bacterial endocarditis for which death certificates were found, 37, or 13 4 percent, were nonresidents. This was uninfluenced by the relationship of subacute bacterial endocarditis to rheumatic heart disease.

Coroner's cases.—Among 860 death certificates filed at the local office of vital statistics of the State Department of Health and describing deaths from rheumatic heart disease, including subacute bacterial endocarditis as a complicating factor, in Philadelphia hospitals from January 1, 1930, to December 31, 1934, 68, or 7 9 percent, indicated that the deaths had been investigated by the coroner's office because the patient was admitted to hospital for a period of less than 24 hours before death. Excluding 175 deaths from subacute bacterial endocarditis apparently superimposed on rheumatic heart disease, 63, or 9.2 percent, of 685 deaths from rheumatic heart disease were the subject of a coroner's inquest. The mean age of these deaths was 29.4 years, approximately the same as that of all deaths from rheumatic heart disease in Philadelphia hospitals.

It is noteworthy that such a relatively high percentage of deaths from this essentially chronic disease occur suddenly or are unattended by a physician. This suggests that there are other types of heart disease than acute coronary occlusion and cardiovascular syphilis of interest to students of forensic medicine.

Only 11, or 4.0 percent, of 276 cases of subacute bacterial endocarditis were investigated by the coroner's office. Sudden deaths due to this condition are not uncommon, but the cause is usually so obvious that a coroner's investigation is not deemed necessary. Since this disease is generally characterized by a wasting illness, comparatively few patients are admitted to hospital just prior to death.

Deaths among Jewish persons.—Based on information from hospital records and death certificates, 120 deaths from rheumatic heart disease including subacute bacterial endocarditis were indicated among Jewish persons. According to the United States Census of 1930 there were 270,000 Jews in Philadelphia. On this basis, the mean annual death rate among Jewish persons in Philadelphia hospitals during the 5-year period was 8.3 per 100,000 Jewish population. The mean annual death rate among white gentiles was 7.9 per 100,000 population, suggesting very little difference. Of the 120 deaths, 54, or 45 percent, were males, and 66, or 55 percent, were females. The mean age at

death was 28.7 years. The age distribution was similar to that of the fatal cases as a whole.

Deaths during pregnancy.—Twenty-one cases of rheumatic heart disease terminated fatally during pregnancy. Of this number, 4 died primarily as a result of complications of pregnancy, 1 died of diabetes mellitus, while 16 died of rheumatic heart disease aggravated in most instances by the pregnant state. Of the deaths attributable to rheumatic heart disease, 9 followed Caesarean sections, 2 followed therapeutic abortions, 3 occurred during childbirth, and 2 followed congestive heart failure during the early months of pregnancy. Of the 4 deaths directly attributable to pregnancy 1 was due to puerperal sepsis, 2 to postpartum hemorrhage, and 1 to extrauterine pregnancy. Altogether 21, or 18.1 percent, of 116 pregnant women with rheumatic heart disease died.

This incidence of fatalities from rheumatic heart disease is considerably higher than generally indicated at the present time. Carr and Hamilton (*37*) report that with careful antenatal supervision the mortality among pregnant women with serious heart disease at the Boston Lying In Hospital has been reduced from 12 percent to 3 percent in a period of 15 years. The wide discrepancy can largely be explained because of difference in antenatal care. Most of the patients in this series who died were admitted in a serious condition and with little or no previous supervision.

Another explanation is that owing to imperfect cross-indexing of hospital records some cases which survived pregnancy were probably not included in this series. This would result in an erroneously high incidence of mortality from heart disease during pregnancy. As indicated in Part I of this study, the recording and filing of case records describing heart disease was less satisfactory in maternity hospitals and departments than in other places.

SUMMARY

Of the 5,921 admissions involving rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis to Philadelphia hospitals from January 1, 1930, to December 31, 1934, 1,020, or 17.2 percent, are known to have terminated fatally during the period under study or during an admission begun prior to January 1, 1935. Excluding subacute bacterial endocarditis apparently not superimposed on rheumatic heart disease, death occurred in 916, or 15.8 percent, of 5,801 admissions for rheumatic conditions. Of 4,653 cases, in contradistinction to admissions, of rheumatic conditions and subacute bacterial endocarditis, 1,020, or 21.9 percent, died. Excluding subacute bacterial endocarditis apparently not superimposed on rheumatic heart disease, 916, or 20.2 percent, of 4,538 cases resulted fatally.

Of the 916 fatal cases of rheumatic heart disease, 94.0 percent were admitted primarily for rheumatic conditions or subacute bacterial endocarditis superimposed on rheumatic heart disease.

The cause of death of only 1.6 percent of 916 fatal clinical cases of rheumatic heart disease appeared to be attributable directly to causes other than rheumatic heart disease or subacute bacterial endocarditis as a complication. Had this study been made on the basis of post-mortem examinations rather than clinical cases of rheumatic heart disease, this percentage in all likelihood would have been substantially increased.

With one possible exception the cause of 916 deaths involving rheumatic conditions, including subacute bacterial endocarditis as a complicating factor, was rheumatic heart disease. In no instance was death attributable to the arthritic manifestations of rheumatic fever or the cerebral manifestations of Sydenham's chorea.

Most deaths from rheumatic heart disease among patients who have been hospitalized occur in hospitals; almost three-fourths of the fatal cases are admitted only once.

The mean age at death from rheumatic heart disease, regardless of its association with subacute bacterial endocarditis, in both clinical and necropsy series is slightly less than 30 years. A slightly greater proportion of deaths is indicated among females than among males. Taking into consideration the less favorable economic circumstances of Negroes, the proportion of deaths from rheumatic heart disease in hospitals among members of this race was not as great as might be expected. This is probably influenced by the age distribution of the Negro population as a result of migration in recent years. The mean ages and age distributions do not suggest as great differences on the basis of race and sex as encountered in certain other types of heart disease.

Among 916 deaths from rheumatic heart disease, including subacute bacterial endocarditis as a complication, the greatest number occurred during the 20–29-year age period, with nearly as many in the 10–19- and 30–39-year age periods. Over 63 percent occurred during these 3 age decades.

Over 50 percent of deaths from rheumatic heart disease occurred among persons less than 30 years of age, while only 3 percent occurred among persons over 60 years of age. Unlike many forms of heart disease, practically all deaths from rheumatic heart disease occur before the expiration of a normal span of life.

The age distribution of 732 deaths from rheumatic heart disease, exclusive of subacute bacterial endocarditis as a complication, manifested a double humped curve with peaks in the 10–19- and 30–39-year age decades.

Over 75 percent of the deaths from rheumatic heart disease among persons under 30 years of age were apparently due to active rheumatic infection. Rheumatic infection is almost invariably the cause of death in children and young persons. With advancing age it becomes a less significant factor.

The peak of deaths from subacute bacterial endocarditis, regardless of its relationship to rheumatic heart disease, occurred during the 20–29-year age decade. The distribution by age decades and mean ages at death indicated death at ages younger by several years from subacute bacterial endocarditis superimposed on rheumatic heart disease than from other forms of subacute bacterial endocarditis.

These studies do not suggest that deaths from rheumatic heart disease in Philadelphia hospitals are more common among persons foreign born or of foreign extraction than among old-stock white Americans; if anything, the opposite obtains. This is probably influenced by the readiness with which various racial groups avail themselves of hospital facilities, their economic status, and the relative age of foreign groups, which is dependent in no small measure on the period of greatest immigration.

From the distribution of deaths by socioeconomic groups it is inferred that fatalities from rheumatic heart disease are disproportionately high among the laboring classes. Few deaths were indicated among professional men. In rheumatic heart disease choice of occupation is often limited because the disease develops during childhood; as a result persons with rheumatic heart disease are not as likely to engage in occupations requiring strenuous exertion as their social status would otherwise suggest.

Rheumatic heart disease results in approximately 200 deaths in Philadelphia hospitals annually; 165 are due primarily to rheumatic heart disease, while 35 are due to subacute bacterial endocarditis superimposed on rheumatic heart disease. In about 0.10 percent of admissions from all causes, death is due to rheumatic heart disease.

Definite histories of rheumatic fever, Sydenham's chorea, or both of these conditions were obtained in 66.2 percent of fatal cases. In nearly 80 percent of instances in which the age at onset was given, the primary rheumatic manifestation developed prior to age 20 years; in less than 3 percent was onset indicated among persons past 40 years of age.

The mean age at onset was 14.7 years, the mode, 9.3 years. The mean interval between the primary rheumatic manifestation and death was 13.4 years. Among 542 fatal cases in which the duration was ascertained, death resulted in less than 1 year in 13.5 percent, in less than 5 years in nearly 32 percent, and in less than 10 years from the onset of the primary rheumatic manifestation in over 48 percent.

At least 3.5 to 4.5 percent of first attacks of rheumatic fever terminated fatally. If deaths from fulminating rheumatic carditis without arthritic manifestations of rheumatic fever are included, the percentage of initial case fatalities becomes even higher.

Despite the preeminence of Philadelphia as a medical center, mortality from rheumatic heart disease among hospital patients constitutes a distinctly local problem; at least 87.2 percent of fatal cases were residents.

Nearly 8 percent of deaths from rheumatic heart disease required investigation by the coroner's office because of their suddenness or because the patient had been unattended by a physician. To this extent rheumatic heart disease is a problem of interest to students of forensic medicine. Only 4.0 percent of deaths from subacute bacterial endocarditis were the subject of a coroner's investigation.

The mean annual death rate from rheumatic heart disease in hospitals among Jewish persons was approximately the same as among white gentiles.

Twenty-one deaths among hospital patients with rheumatic disease occurred during pregnancy and the puerperium; 16 were directly attributable to rheumatic heart disease. Of 116 pregnant women with rheumatic heart disease, 18.1 percent died. This high percentage is probably due to the severity of their condition on admission and to the likelihood that some cases of rheumatic heart disease which survived pregnancy were not identified for study because of obsolete filing systems and diagnostic nomenclature in some maternity hospitals.

REFERENCES

(1) Davis, David, and Weiss, Soma: Rheumatic heart disease. 1. Incidence and role in the causation of death. A study of 5,215 consecutive necropsies. Am. Heart J., 7: 146 (1931).

(2) Hedley, O. F.: A study of 450 fatal cases of heart disease occurring in Washington (D. C.) hospitals during 1932, with special reference to etiology, race, and sex. Pub. Health Rep., 50: 1127 (1935).

(3) Hedley, O. F.: Mortality from rheumatic heart disease in Philadelphia during 1936. Pub. Health Rep., 52: 1907 (1937).

(4) Coombs, Carey F.: Rheumatic Heart Disease. Wm. Wood & Co., New York, 1924.

(5) DeGraff, Arthur C., and Lingg, Claire: The course of rheumatic heart disease in adults. 1. Factors pertaining to age at initial infection, the development of cardiac insufficiency, duration of life, and cause of death. Am. Heart J., 10: 459 (1935).

(6) Willius, F. A.: A study of the course of rheumatic heart disease. Am. Heart J., 3: 139 (1927).

(7) Cohn, A. E.: Heart disease from the point of view of the public health. Am. Heart J., 2: 275 and 386 (1927).

(8) Cohn, A. E., and Lingg, Claire.: Heart disease from the point of view of the public health, 1933. Am. Heart J., 9: 283 (1934).

(9) Dublin, Louis I., and Lotka, Alfred J.: Twenty-five Years of Health Progress. Metropolitan Life Insurance Co., 1937.

(10) Emerson, Haven: Incidence and prevalence of disease of the heart. J. Indiana Med. Assoc., 31: 433 (1938).

(11) Hedley, O. F.: Trends, geographical and racial distribution of mortality from heart disease among persons 5-24 years of age in the United States during recent years (1922–1936). A preliminary report. Pub. Health Rep., **54**: 2271 (1939).
(12) Davis, David, and Weiss, Soma: Rheumatic heart disease. 2. Incidence and distribution of the age of death. Am. Heart J., **8**: 182 (1932).
(13) Brenner, O.: Observations on acute rheumatism and rheumatic heart disease—based on 227 clinical cases occurring at the Queens Hospital in the 5 years 1924–1928 and on 133 autopsy cases occurring in the 10 years 1924–1933. Birmingham Med. Rev., **9**: 193 (1934).
(14) Hedley, O. F.: The picture of heart disease mortality obtained from vital statistics in Washington, D. C., during 1932. Pub. Health Rep., **51**: 285 (1936).
(15) Dauer, C. C.: Mortality rates of organic diseases of the heart by geographical areas in the United States. Am. Heart J., **10**: 955 (1935).
(16) Mills, C. A.: Seasonal and regional factors in acute rheumatic fever and rheumatic heart disease. J. Lab. and Clin. Med., **24**: 53 (1938).
(17) Atwater, Reginald M.: Studies in the epidemiology of acute rheumatic fever and related diseases in the United States, based on mortality statistics. Am. J. Hygiene, **7**: 343 (1927).
(18) Hedley, O. F.: Analysis of 5,116 deaths reported as due to acute coronary occlusion in Philadelphia, 1933–1937. Pub. Health Rep., **54**: 972 (1939).
(19) Findlay, Leonard: The Rheumatic Infection in Childhood. Wm. Wood & Co., New York, 1932.
(20) Rothschild, M. A., Kugel, M. A., and Gross, Louis: Incidence and significance of active infection in cases of rheumatic cardiovalvular disease during various age periods. Am. Heart J., **9**: 586 (1934).
(21) Bland, E. F., and Jones, T. D.: Fatal rheumatic fever. Arch. Int. Med., **61**: 161 (1938).
(22) Fulton, Marshall, and Levine, S. A.: Subacute bacterial endocarditis with special reference to the valvular lesions and previous history. Am. J. Med. Sci., **183**: 60 (1932).
(23) Horder, T. J.: Infective endocarditis with an analysis of 150 cases with special reference to the chronic form of the disease. Quart. J. Med., **2**: 289 (1908–9).
(24) Blumer, George: Subacute bacterial endocarditis. Medicine, **2**: 105 (1923).
(25) Clawson, B. J.: Endocarditis with special reference to the subacute type. Arch. Int. Med., **33**: 157 (1924).
(26) Thayer, W. S.: Studies on bacterial (infective) endocarditis. Johns Hopkins Hosp. Report, **22**: 1–185 (1926).
(27) Morrison, Hyman: A study of the incidence of subacute bacterial endocarditis at the Massachusetts General Hospital. Bost. Med. and Surg. J., **197**: 46 (1927).
(28) Cabot, Richard C.: Facts on the Heart. W. B. Saunders & Co., Philadelphia, 1926.
(29) Laws, Clarence L., and Levine, S. A.: Clinical notes on rheumatic heart disease with special reference to the cause of death. Am. J. Med. Sci., **186**: 833 (1933).
(30) Fifteenth Census of the United States population, vol. 11, page 497 (1930). Department of Commerce, Bureau of the Census. Government Printing Office, Washington (1933).
(31) Thompson, L. R., and Britten, R. H.: Standards of measurement of ten thousand male workers, with special reference to racial factors. Am. J. Pub. Health, **14**: 383 (1924).
(32) Wilson, May G., Lingg, Claire, and Croxford, G.: Statistical studies bearing on problems in the classification of heart disease. III. Heart disease in children. Am. Heart J., **4**: 164 (1928).
(33) Davis, David, and Weiss, Soma: Rheumatic heart disease. IV. The life history of the severe form of the disease. Am. Heart J., **10**: 486 (1935).
(34) Ash, Rachel: Prognosis of rheumatic infection in childhood—a statistical study. Am. J. Dis. Child., **52**: 280 (1936).
(35) Swift, Homer F.: Nelson's Loose Leaf Medicine, vol. 1, page 401.
(36) Ash, Rachel: Influence of tonsillectomy on rheumatic infection. Am. J. Dis. Child., **55**: 63 (1938).
(37) Carr, F. B., and Hamilton, B. E.: Five hundred women with serious heart disease followed through pregnancy and delivery. Am. J. Obst. and Gyn., **26**: 824 (1933).

POPULATION TRENDS IN STATES AND CITIES AS SHOWN BY PRELIMINARY 1940 CENSUS FIGURES

From time to time the Bureau of the Census is issuing preliminary figures of the 1940 population census for States and for cities of 25,000 population or more. While these figures are based on counts made by the local supervisors, and may be changed somewhat when the final count is checked by the Census Bureau, the changes and trends so far indicated by the preliminary figures are of interest.

For 25 States for which preliminary figures have been announced, the aggregate 1940 population is 43,786,591, as compared with 41,640,821 in 1930 and 37,493,403 in 1920. These figures represent an increase of 5.2 percent in the 1930–40 decennium as compared with an increase of 11.1 percent for the earlier period. The percentage increase for the current census period will probably be much larger when the data for all States are available. The present list includes many of the agricultural and less populous States, whereas preliminary figures are not yet available for the more highly industrialized States, those with the largest populations, and those to which large migrant populations have been attracted.

Of these 25 States, 5 decreased in population during the past 10 years, the largest percentage decreases being 7.5 percent for South Dakota and 6.0 percent for North Dakota. Nebraska showed a decrease of 4.7 percent, Kansas 4 4, and Oklahoma, 2.8.

Preliminary population figures have been given to date for 381 cities in the United States with a population of 25,000 or more in 1940. The total 1940 population of these cities is 51,151,024, as compared with 48,645,754 in 1930. The increase in the latest decennium is also 5.2 percent, as compared with 25.3 percent in the 1920–30 period. Of these cities, 85 recorded decreases in population in the latest census period while only 21 decreased during the 1920–30 period.

As the growth of cities is primarily due to migration from small towns, villages, and rural areas, there is an indication that the 1940 population census will show a reduction in or perhaps even a reversal of this trend. Population figures for the 1940 census so far available do not reveal to what extent other areas have benefited by this reduced trend to urbanization, but no doubt the development of and tending of population to suburban areas of large cities will account for much of the reduced rate of increase in urban population, while farm and nonfarm rural areas will account for part. A decreasing birth rate in cities may also be a minor factor.

The list of 25 of the largest cities includes practically the same cities which had this distinction in 1930, although 8 of these cities, namely, Boston, Cleveland, Newark, Philadelphia, Pittsburgh, Roch-

ester, St. Louis, and San Francisco, recorded losses in the 1940 census, and 13 changed in rank. Houston, Tex., and Denver, Colo., were included in the list for the first time, eliminating Jersey City, N. J., and Portland, Oreg. Houston made the largest upward shift in relative rank, moving from twenty-sixth to twenty-first place, while Jersey City showed the largest drop—from twenty-third to thirtieth. Washington, D. C., moved up from fourteenth to eleventh place. Following is the list of the 25 largest cities in the United States, by rank, according to preliminary figures of the 1940 census, with populations in 1940 and 1930. Final check by the Bureau of the Census may result in some changes, but is not likely to change the relative standing.

1940 rank	*1940 population*	*1930 population*	*1940 rank*	*1940 population*	*1930 population*
1. New York	7, 380, 259	6, 930, 446	14. Buffalo	575, 150	573, 076
2. Chicago	3, 384, 556	3, 376, 438	15. New Orleans	492, 282	458, 762
3. Philadelphia	1, 935, 086	1, 950, 961	16 Minneapolis	489, 976	464, 351
4. Detroit	1, 618, 549	1, 568, 662	17. Cincinnati	452, 852	451, 160
5. Los Angeles	1, 496, 792	1, 238, 048	18. Newark	428, 236	442, 337
6. Cleveland	878, 385	900, 429	19. Kansas City	400, 175	399, 746
7. Baltimore	854, 144	804, 874	20. Indianapolis	386, 170	364, 161
8. St. Louis	813, 748	821, 960	21. Houston	386, 150	292, 352
9. Boston	769, 520	781, 188	22. Seattle	366, 847	365, 583
10. Pittsburgh	665, 384	669, 817	23. Rochester	324, 694	328, 132
11. Washington	663, 153	486, 869	24. Louisville	318, 713	307, 745
12. San Francisco	629, 553	634, 394	25. Denver	318, 415	287, 861
13. Milwaukee	589, 558	578, 249			

HAY FEVER AND ASTHMA *

Definition.

Hay fever is a coryza (swelling of the mucous lining of the nose) and irritation of the eyes occurring in individuals who are sensitive to certain substances either in the air, in their diet, or in their environment. When this reaction occurs in the bronchial tubes, the swelling causes a difficult wheezy type of breathing and the condition is known as asthma. This peculiar make-up which causes persons to become sensitive is called allergy.

Occurrence.

Hay fever and asthma are two of the most common of our nonfatal diseases, occurring in individuals of all ages and races. From a recent survey made by the National Institute of Health, it is estimated that about 5 percent of the population of the United States suffer from these disorders. Three seasonal varieties of hay fever are observed:

1. The spring type which begins at the end of March and extends to the end of May and is due to the pollen of trees such as the oak, elm, and birch.

*This material is available in leaflet form and a limited number of copies may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

2. The summer type, beginning at the end of May and extending to the middle of July, is caused by the pollens of grasses and sorrel.

3. The fall type which begins in the middle of August and continues until frost with the pollens of the ragweed mainly responsible.

Dietary and environmental causes are always present.

Symptoms.

There is a puffiness and itching of the eyelids, with a tendency to tears and discomfort on exposure of the eyes to light. The mucous lining of the nose swells, and the profuse watery discharge and sneezing are the cause of much annoyance. Headache is common and may be severe. Local or general swelling of the skin with itching (hives) may occur. With asthma, there is a tendency to wheeze on breathing, expectoration of clear mucous sputum, and spasmodic cough.

Diagnosis.

Recognition of these conditions is easy; it is the discovery of the specific causes of hay fever and asthma which presents a difficult problem to the physician. Certain tests of the skin, eye, nose, and diet are valuable aids. The patient should not expect a complete diagnosis on his first or second visit to a physician. After one cause is found, others must be sought in case of recurrence. It is reported that over 50 percent of hay fever patients are sensitive to more than one agent.

Outcome.

The hope of permanent relief from attacks of hay fever and asthma depends entirely upon the recognition of the cause and the possibility of its removal. Infection of the sinuses occurs in a large percentage of cases, but in only a relatively small percentage does this become important enough to need special treatment. Approximately 90 percent of treated individuals are greatly relieved, the greatest relief usually being observed by those who also suffer from asthma.

Treatment.

Success in treatment depends primarily on a correct and complete diagnosis. Extracts of the various agents responsible for the illness are injected in very small doses and then gradually increased until the patient is able to withstand many times the initial dose. This procedure is termed "desensitizing." The series of injections is timed so that the maximum dose is reached just before the onset of symptoms. With the intelligent cooperation of the patient, a physician can now give these injections safely and in many cases without discomfort or reactions. This treatment is effective for one season only.

The physician can prescribe certain drugs which, applied locally, serve greatly to relieve nose and eye symptoms.

Climate.

A person who blindly tries one locality after another in an effort to find relief is likely to waste time and money unless he knows the source of his illness. There is no particular locality in which the patient suffering from the spring or summer type of hay fever may be assured of complete relief except upon the ocean. For the autumnal type, the White Mountains, northern Maine and the mountain States, the southern tip of Florida, and the region west of the Rocky Mountains are recommended. At present there are air-conditioning machines on the market which may give relief to hay-fever sufferers.

Prevention.

Since heredity plays so important a part in these diseases, prompt attention to sensitizing agents in childhood and, wherever possible, their removal from the diet and environment, are necessary measures of prevention. Proper timing of the desensitizing injections will minimize the patient's distress. Conditions of the nose and throat, such as a deflected septum or diseased tonsils, which may play a part in some patients, should be attended to.

Attention to simple hygienic measures will greatly alleviate symptoms.

The sleeping room should be kept closed during the day, the windows being opened at night when the atmosphere contains less pollen.

Long motor trips should be avoided as should also violent exercise during the pollen season.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT—CONSULT YOUR DOCTOR

COURT DECISION ON PUBLIC HEALTH

Conviction of violation of city sanitary code in keeping unwholesome canned grapes reversed.—(New York Court of Appeals; *People* v. *Wallace & Co.*, 26 N.E.2d 959; decided April 16, 1940.) The defendant company was convicted of a violation of section 163 of the New York City Sanitary Code, which section provided, among other things, that no vegetables not being then wholesome or safe for human food should be brought into the city or kept, offered for sale, or sold as such food, or kept or stored anywhere in the city, and that any vegetables packed in cans, the contents of which had become fermented as evidenced by swelling or bulging, should be deemed not wholesome or safe for human food. The term "vegetables" included any article used as and for human food other than milk or meat. The case against the defendant, a candy manufacturer, was that a health department inspector had found, in a storeroom of defendant's factory, 12 cans that were swollen and bulging and which contained

grapes that had become unwholesome. These cans had been in the storeroom for at least a month. In defense the proof was that the defendant made no use of the foodstuffs kept under lock in its storeroom without first inspecting them and that any article found on inspection not to be wholesome was put aside for return to the seller. There was no proof in respect of the time when the grapes had become fermented, nor was it shown that anything in respect of the time of fermentation could have been validly inferred from the swollen and bulging shape of the cans.

In considering the case on appeal by the defendant, the court of appeals said that, on such record, the judgment of guilt must mean that the defendant's mere possession of the containers made it answerable as for a crime once the ensealed grapes became unwholesome, and that the broad text of the section—that no unwholesome food should be "kept or stored anywhere in the said city"—appeared to go a long distance in that direction. "But a penal statute," stated the court, "is not necessarily to be liberally applied in all circumstances." It was said to be the court's best judgment that no considerations of expediency required such unfairness as would result were section 163 to be so freely construed as to force its application to the facts which in the instant case were found below. The judgments were reversed and the information dismissed.

DEATHS DURING WEEK ENDED SEPTEMBER 7, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 7, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,313	7,117
Average for 3 prior years	6,928	
Total deaths, first 36 weeks of year	307,328	301,247
Deaths under 1 year of age	444	462
Average for 3 prior years	479	
Deaths under 1 year of age, first 36 weeks of year	18,044	18,148
Data from industrial insurance companies:		
Policies in force	64,915,823	66,735,832
Number of death claims	8,420	7,914
Death claims per 1,000 policies in force, annual rate	6.8	6.2
Death claims per 1,000 policies, first 36 weeks of year, annual rate	9.8	10.3

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 14, 1940

Summary

The incidence of poliomyelitis again registered an increase (of 39 cases), but only about one-fourth that (152 cases) for the preceding week. For the current week, 797 cases were reported, as compared with 758 for last week, 606 for the next preceding week, and a 5-year (1935–39) median of 501.

The highest incidence continues in the East North Central and West North Central States, which reported 578 cases, or more than 72 percent of the total, about the same percentage of the total as reported last week. While increases are recorded for 7 of the 9 geographic areas, the largest are shown for the two North Central groups and the South Atlantic States. In the North Central areas, the States reporting the largest increases were as follows: Michigan, from 139 to 160; Illinois, from 40 to 59; Iowa, from 80 to 100; and Missouri, from 32 to 36. In the South Atlantic area, the number of cases in West Virginia decreased from 51 to 48, but increases in North Carolina (5 to 10), Georgia (0 to 4), Florida (0 to 2), and South Carolina (1 to 2), brought a net increase for this group of States as a whole. The incidence declined in each of the three Pacific States, which reported a total of 30 cases as compared with 40 for the preceding week.

Each of the other 8 diseases included in the following table, with the exception of influenza and measles, was below the 5-year median expectancy for the current week. Eleven cases of Rocky Mountain spotted fever were reported, only one of which was in the Rocky Mountain area, 5 cases of undulant fever, 11 cases of encephalitis (7 in Colorado), and 50 cases of typhus fever (12 in Georgia, and 11 in Texas).

For the current week, the Bureau of the Census reported 7,205 deaths in 88 major cities of the United States, as compared with 7,313 for the preceding week, and with a 3-year (1937–39) average of 7,268 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended September 14, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 14, 1940	Sept. 16, 1939		Sept. 14, 1940	Sept. 16, 1939		Sept. 14, 1940	Sept. 16, 1939		Sept. 14, 1940	Sept. 16, 1939	
NEW ENG.												
Maine	1	1	1	------	2	------	12	7	1	1	0	0
New Hampshire	0	0	0	------	------	------	0	2	2	0	0	0
Vermont	1	0	2	------	------	------	0	2	1	1	0	0
Massachusetts	0	2	2	------	------	------	65	22	21	1	1	1
Rhode Island	0	0	0	------	------	------	0	11	2	0	0	0
Connecticut	0	2	2	3	------	1	4	3	4	0	0	0
MID. ATL.												
New York	7	11	11	[1] 5	[1] 4	[1] 4	77	60	60	8	4	7
New Jersey [2]	8	1	7	------	3	7	33	6	20	0	0	2
Pennsylvania	7	17	19	------	------	------	35	16	32	1	3	5
E. NO. CEN.												
Ohio	4	16	14	12	7	14	13	17	13	0	1	2
Indiana	2	14	13	3	17	9	5	1	1	0	0	1
Illinois	14	17	19	1	5	5	15	20	18	3	1	1
Michigan [3]	0	2	9	2	2	1	44	0	10	0	1	3
Wisconsin	0	0	2	21	26	20	61	44	40	3	0	1
W. NO. CEN.												
Minnesota	1	0	4	1	------	2	1	6	6	0	0	0
Iowa [2]	2	3	2	3	------	------	18	7	3	0	0	0
Missouri	1	13	21	2	------	11	2	5	5	1	0	1
North Dakota	1	0	1	------	4	2	0	2	2	0	0	0
South Dakota	1	5	1	------	5	------	1	6	0	0	1	0
Nebraska	0	1	2	------	------	------	1	2	2	0	0	0
Kansas	7	11	9	1	------	1	14	9	5	0	2	0
SO. ATL.												
Delaware	0	0	0	------	------	------	2	1	0	0	0	0
Maryland [2,3]	2	2	6	2	1	1	2	2	5	0	1	1
Dist. of Col.	2	2	2	------	------	------	0	0	0	0	0	0
Virginia	8	43	33	47	42	------	10	9	6	0	1	1
West Virginia [3]	6	10	11	11	9	14	3	7	3	3	2	2
North Carolina [2,4]	26	72	72	2	------	1	3	4	4	1	2	0
South Carolina [4]	9	12	18	148	119	112	4	7	7	0	0	0
Georgia [4]	16	38	36	2	13	------	1	4	0	0	0	0
Florida [4]	3	7	8	2	------	------	1	0	3	0	0	0
E. SO. CEN.												
Kentucky	13	8	27	5	------	7	3	16	12	0	0	0
Tennessee	5	22	29	3	9	9	10	4	3	1	0	3
Alabama [4]	20	41	33	6	8	10	2	0	2	0	1	2
Mississippi [3,4]	12	26	21	------	------	------	0	------	0	0	1	1
W. SO. CEN.												
Arkansas	12	25	19	1	6	6	1	10	1	0	0	0
Louisiana [4]	8	14	10	2	1	2	0	1	1	0	0	1
Oklahoma [2]	8	8	8	44	16	13	1	2	1	0	1	1
Texas [4]	14	40	40	79	44	44	22	39	9	0	1	1
MOUNTAIN												
Montana [2]	1	0	1	2	------	------	3	5	5	1	1	1
Idaho	0	1	1	------	------	------	0	5	3	0	0	0
Wyoming	1	0	0	------	------	------	0	0	1	0	1	0
Colorado	3	1	7	1	5	------	3	0	4	0	0	0
New Mexico	4	0	2	2	------	------	1	1	1	0	0	0
Arizona	0	0	2	13	18	18	16	2	1	0	1	0
Utah [3]	2	0	0	------	------	------	6	7	3	0	0	0
PACIFIC												
Washington	3	0	0	------	------	------	8	48	11	1	0	0
Oregon	2	1	1	6	9	9	16	3	7	0	0	0
California	17	15	22	12	10	10	42	38	38	1	0	0
Total	249	504	565	444	385	385	561	463	463	27	27	53
37 weeks	9,707	13,646	16,640	170,891	153,176	142,573	231,174	350,169	350,169	1,218	1,479	4,369

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 14, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 14, 1940	Sept. 16, 1939		Sept. 14, 1940	Sept. 16, 1939		Sept. 14, 1940	Sept. 16, 1939		Sept. 14, 1940	Sept. 16, 1939	
NEW ENG.												
Maine	1	0	4	8	5	5	0	0	0	3	8	1
New Hampshire	0	0	0	2	0	0	0	0	0	0	0	0
Vermont	2	0	1	3	3	3	0	0	0	1	0	0
Massachusetts	4	4	4	37	18	34	0	0	0	1	5	5
Rhode Island	1	1	1	1	1	3	0	0	0	0	0	0
Connecticut	3	1	1	11	7	12	0	0	0	3	4	4
MID. ATL.												
New York	[5] 14	116	91	72	62	88	0	0	0	16	21	24
New Jersey [2]	3	28	21	24	12	16	0	0	0	5	11	11
Pennsylvania	14	41	38	44	61	78	0	0	0	22	11	43
E. NO. CEN.												
Ohio	53	13	13	52	80	83	1	0	0	8	19	41
Indiana	58	6	3	14	30	34	0	3	2	8	9	9
Illinois	59	16	18	100	52	94	0	7	0	12	82	20
Michigan [3]	160	61	57	55	59	59	0	0	0	3	7	10
Wisconsin	31	2	4	37	56	55	0	1	1	0	0	2
W. NO. CEN.												
Minnesota	9	60	8	16	24	24	0	0	0	4	1	2
Iowa [3]	100	12	7	25	19	24	1	9	1	1	2	2
Missouri	36	2	4	15	25	29	0	1	0	10	25	25
North Dakota	2	1	0	0	6	5	8	0	0	1	2	1
South Dakota	7	2	2	3	13	11	8	1	1	0	2	1
Nebraska	14	5	3	1	11	11	0	1	1	0	0	0
Kansas	49	4	4	32	18	31	0	0	0	10	8	10
SO. ATL.												
Delaware	0	0	0	4	8	3	0	0	0	0	2	1
Maryland [2, 3]	1	1	1	6	13	15	0	0	0	4	8	11
Dist. of Col.	0	1	2	3	2	5	0	0	0	1	5	1
Virginia	16	3	3	13	20	20	0	0	0	21	15	18
West Virginia [3]	48	0	2	16	34	31	0	0	0	8	16	23
North Carolina [2, 4]	10	8	8	46	62	44	0	0	1	13	4	13
South Carolina [4]	2	5	0	9	9	8	0	0	0	15	11	15
Georgia [4]	4	0	2	12	21	10	0	0	0	13	8	13
Florida [4]	2	4	1	1	4	4	0	0	0	4	5	8
E. SO. CEN.												
Kentucky	16	9	4	25	34	34	0	0	0	23	30	36
Tennessee	4	0	1	26	28	25	0	0	0	20	12	16
Alabama [4]	1	1	3	15	19	17	0	0	0	12	9	11
Mississippi [3, 4]	3	2	4	11	6	8	0	0	0	9	4	9
W. SO. CEN.												
Arkansas	1	1	1	11	9	6	0	1	0	26	14	14
Louisiana [4]	3	0	1	1	7	4	0	0	0	13	15	17
Oklahoma [2]	8	1	1	16	9	9	1	8	0	12	23	23
Texas [4]	8	12	2	12	25	24	0	0	0	47	49	49
MOUNTAIN												
Montana [2]	4	0	0	11	10	15	0	2	2	2	1	3
Idaho	3	0	0	0	2	2	0	0	0	12	3	4
Wyoming	2	0	0	1	3	4	0	0	0	2	7	0
Colorado	4	18	4	13	20	9	0	7	2	7	4	4
New Mexico	2	8	1	2	6	6	0	0	0	3	1	16
Arizona	0	8	3	2	0	2	0	0	0	0	8	3
Utah [2]	5	4	1	8	15	15	0	0	0	1	0	0
PACIFIC												
Washington	12	1	1	10	17	17	0	0	5	1	2	6
Oregon	4	2	2	3	10	16	0	0	0	2	7	5
California	14	42	19	55	72	75	0	1	1	10	8	11
Total	797	501	501	884	1,022	1,182	14	42	42	389	468	604
37 weeks	[5] 4,856	3,955	3,955	121,688	119,962	168,788	2,002	8,763	8,184	6,636	9,211	10,441

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 14, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough — Week ended Sept. 14, 1940	Whooping cough — Week ended Sept. 16, 1939
NEW ENG.		
Maine	27	35
New Hampshire	0	0
Vermont	1	36
Massachusetts	130	134
Rhode Island	1	31
Connecticut	25	69
MID. ATL.		
New York	255	408
New Jersey [2]	135	135
Pennsylvania	336	332
E. NO. CEN.		
Ohio	220	162
Indiana	31	45
Illinois	112	275
Michigan [3]	285	170
Wisconsin	127	138
W. NO. CEN.		
Minnesota	57	72
Iowa [2]	17	7
Missouri	41	19
North Dakota	4	32
South Dakota	9	4
Nebraska	2	6
Kansas	33	35
SO. ATL.		
Delaware	12	8
Maryland [2, 3]	65	39
Dist. of Col	4	26
Virginia	56	28
West Virginia [3]	38	2
North Carolina [2, 4]	86	79
SO. ATL.—continued		
South Carolina [4]	26	14
Georgia [4]	7	14
Florida [4]	1	11
E. SO. CEN.		
Kentucky	79	39
Tennessee	29	33
Alabama [4]	11	15
Mississippi [3, 4]	----------	----------
W. SO. CEN.		
Arkansas	5	5
Louisiana [4]	6	37
Oklahoma [2]	8	11
Texas [4]	96	47
MOUNTAIN		
Montana [2]	8	7
Idaho	0	0
Wyoming	1	4
Colorado	15	11
New Mexico	6	46
Arizona	3	15
Utah [3]	22	44
PACIFIC		
Washington	53	16
Oregon	11	16
California	228	87
Total	2,724	2,799
37 weeks	117,570	137,038

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Sept. 14, 1940, 11 cases as follows: New Jersey, 1; Iowa, 1; Maryland, 2; North Carolina, 3; Oklahoma, 3, Montana, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Sept. 14, 1940, 50 cases as follows: North Carolina, 7; South Carolina, 7; Georgia, 12; Florida, 5; Alabama, 5; Mississippi, 1; Louisiana, 2; Texas, 11.
[5] Delayed report has been received of 13 cases of poliomyelitis in New York City for the period Mar. 10 to Aug. 16.

PLAGUE INFECTION IN FLEAS FROM GROUND SQUIRRELS IN SUBLETTE COUNTY, WYOMING

Under date of August 28, 1940, Surgeon L. B. Byington reported plague infection proved in a pool of 15 fleas from 12 ground squirrels (*C. armatus*) shot on August 7, 8 to 10 miles north of Kendal Ranger Station, Sublette County, Wyo.

MONTHLY REPORTS FROM STATES

Case reports consolidated for the quarter April–June 1940

[Diseases covered by weekly telegraphic reports not included]

Division and State	Chickenpox	Dysentery, amoebic	Dysentery, bacillary	Dysentery, unspecified	Encephalitis, epidemic or lethargic	German measles	Hookworm disease	Malaria	Mumps	Ophthalmia neonatorum	Pellagra	Puerperal septicemia	Rabies in animals	Rabies in man	Septic sore throat	Trachoma	Tularaemia	Undulant fever
NEW ENG.																		
Maine	588					100			40	2					5			9
New Hampshire	115								34									
Vermont	370					28			228									15
Massachusetts	3,344	1	50		5	229		3	2,310	244	3		19		67	3		15
Rhode Island	296					19			161				7		47			6
Connecticut	1,619		3		3	58		4	855						84	1		16
MID. ATL.																		
New York	9,266	12	85		42	735		41		[1] 25			31		454		1	47
New Jersey	4,386	2	2		5	284		1	5,665	42			170	2	40	1		21
Pennsylvania	10,432	2			5	277		3	3,054	11	1			1		1	9	30
E. NO. CEN.																		
Ohio	5,060		41		6	127		4	2,189		1	5		2	33	16		19
Indiana	602							2	1,381				85		3	3	2	21
Illinois	6,341	13	24		6	184		54	2,166	11	5		71		14	64	8	31
Michigan	5,461	1	4		2	207		16					13		405		1	29
Wisconsin	5,700	1				133			3,610	2					67		3	32
W. NO. CEN.																		
Minnesota	1,760	9	106		4			1			1		20		52		3	37
Iowa	524		1	1	20	7		28	1,158		1				16		3	55
Missouri	451		12		2			15	229				2	1	22	103	8	7
North Dakota	367				9	2			236						2	3		1
South Dakota	161								130						5	14		2
Nebraska	332				1				565									1
Kansas	1,019	2	1		10	34		5	585						19	2	4	82

SO. ATL.																		
Delaware	135		1			3			8				1		1			3
Maryland	1,666	2	14	2		17		1	243	2	1		2		85		1	6
Dist. of Col	409	2																
Virginia	690	2	247		1			29	252		37				408	2	4	4
West Virginia	228		35		1			1	54		7				28			1
North Carolina	1,376		2			26		59			48				24	3	3	2
South Carolina	445					36	472	2,338	140	8	463		49	1	40		3	2
Georgia	469	19	62	14			5,209	398	381		100				355	1	27	35
Florida	687	9	2			93	1,940	31	139		8		3		11		1	14
E. SO. CEN.																		
Kentucky	751	2	5		3	418		9	905		4				201	44	6	12
Tennessee	458	2	28		2	97	43	310	394	8	37	5			107	1	10	12
Alabama	403	3			12	203		974	373	5	92		63			3	2	20
Mississippi	1,038	493	3,129				1,562	10,352	1,360	20	1,352	67	23			17		4
W. SO. CEN.																		
Arkansas	228	21	33			1	10	861	248	2	170	5	49	3	78	294	24	4
Louisiana	115	7	3		1		16	80	42		16		27		16	12	7	13
Oklahoma	277	6	31		3		2	429	151		33		67		122	25	12	25
Texas	1,849	134	1,118		3			1,493	820	17	407		4			47	14	188
MOUNTAIN																		
Montana	418		4		14	7		1	175						24	1	9	2
Idaho	219				2	7			73						10		2	
Wyoming	54				2	9			229						13		21	10
Colorado	497		1		2				3,441						29		1	21
New Mexico	420	4	10			11		10	141		3	8	24	1	5	4	1	9
Arizona	210			309	5	33		9	397		1					156	1	7
Utah	574	2				82		1	377				2		16		27	5
Nevada	187								10									1
PACIFIC																		
Washington	1,482	2	8		1	109		1	940				10		8	2		2
Oregon	535	3						3	452				5		12		2	
California	7,218	40	139		9	269		42	5,695	9	26		119		24	41	6	90
Total	81,547	796	5,201	326	181	3,825	9,254	17,609	42,156	408	2,817	90	866	11	2,952	864	226	968
Alaska	32					4			1						4			
Hawaii	272	6				54	30	2	73	2						5		
Puerto Rico [2]	187			147				5,147	6	22	10	27						

[1] Exclusive of New York City.

[2] Reports for March, April, and May, 1940.

Case reports consolidated for the quarter April–June 1940—Continued

Division and State	Actinomycosis	Anthrax	Beriberi	Botulism	Dengue	Food poisoning	Granuloma, coccidioidal	Leprosy	Psittacosis	Relapsing fever	Tetanus	Trichinosis	Vincent's infection	Weil's disease
NEW ENG.														
Maine												1	9	
New Hampshire														
Vermont													12	
Massachusetts	1	1									6	18		
Rhode Island														
Connecticut											1	7		
MID. ATL.														
New York		9									10	82	[1] 101	
New Jersey		3									4	3		
Pennsylvania		2										1		
E. NO. CEN.														
Ohio		1									4	11		
Indiana											2			
Illinois	1										7	5	92	
Michigan	2										2	5	54	4
Wisconsin														
W. NO. CEN.														
Minnesota	5								2		2	1		
Iowa														
Missouri											2			
North Dakota	1												10	
South Dakota														
Nebraska														
Kansas	1					2					1	1	42	
SO. ATL.														
Delaware														
Maryland											6	3	35	
Dist. of Col.														
Virginia											1			
West Virginia														
North Carolina													59	
South Carolina					7						4			
Georgia											5			
Florida								1			3		16	

E. SO. CEN.														
Kentucky														
Tennessee											2		12	
Alabama											6			
Mississippi					5									
W. SO. CEN.														
Arkansas		1									3			
Louisiana								7			11			
Oklahoma										9	1		5	
Texas					1			3						
MOUNTAIN														
Montana		1									1			
Idaho													2	
Wyoming													2	
Colorado														
New Mexico	1													
Arizona														
Utah														
Nevada													1	
PACIFIC														
Washington	1					59					1		3	
Oregon													15	
California			2	1		158	10	2		1	17	9		
Total	13	18	2	1	13	219	10	13	2	10	102	147	470	4
Alaska													2	
Hawaii								10			10			1
Puerto Rico [2]											41			

[1] Exclusive of New York City.

[2] Reports for March, April, and May, 1940.

WEEKLY REPORTS FROM CITIES

City reports for week ended August 31, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	87	31	11	155	267	249	2	332	80	1,145	-------
Current week[1]	37	35	13	226	192	179	8	320	55	824	-------
Maine:											
Portland	0	------	0	0	0	0	0	0	0	1	24
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	5
Nashua	0	------	0	0	0	1	0	0	0	0	4
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	9
Rutland	0	------	0	0	1	0	0	0	0	0	10
Massachusetts:											
Boston	0	------	0	13	5	3	0	10	0	33	197
Fall River	0	------	0	1	1	0	0	0	0	9	17
Springfield	0	------	0	0	0	1	0	2	0	1	29
Worcester	0	------	0	9	4	2	0	2	0	3	62
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	10
Providence	0	------	0	2	0	2	0	2	0	1	52
Connecticut:											
Bridgeport	0	------	0	0	0	1	0	1	2	1	34
Hartford	0	------	0	0	0	3	0	2	0	0	34
New Haven	0	------	0	0	1	2	0	0	1	9	31
New York:											
Buffalo	0	------	0	0	4	3	0	5	0	5	109
New York	4	6	0	50	34	11	0	67	11	118	1,213
Rochester	0	------	0	0	4	0	0	1	0	13	64
Syracuse	0	------	0	2	4	2	0	1	0	6	83
New Jersey:											
Camden	0	1	1	0	0	8	0	2	0	0	31
Newark	0	------	0	10	1	3	0	5	0	17	76
Trenton	0	------	0	0	2	1	0	3	2	2	34
Pennsylvania:											
Philadelphia	0	2	2	13	4	9	0	18	2	54	352
Pittsburgh	0	------	2	2	5	4	0	6	1	14	131
Reading	0	------	0	4	1	0	0	3	0	12	19
Scranton	0	------	-------	0	-------	0	0	-------	0	0	-------
Ohio:											
Cincinnati	0	------	0	0	1	2	0	6	0	12	119
Cleveland	1	14	2	8	8	4	0	13	0	55	164
Columbus	1	------	0	1	0	0	0	0	0	9	63
Toledo	0	------	0	0	3	5	0	1	3	10	55
Indiana:											
Fort Wayne	1	------	0	0	1	1	0	0	0	0	17
Indianapolis	0	------	0	0	3	5	0	3	0	2	97
Muncie	0	------	0	0	0	0	0	0	0	0	8
South Bend	0	------	0	0	2	0	0	2	0	0	20
Terre Haute	0	------	0	0	1	0	0	0	0	0	16
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	5
Chicago	5	2	1	15	16	28	0	33	3	80	606
Elgin	0	------	0	0	0	0	0	0	0	0	6
Moline	0	------	0	0	0	0	0	0	0	0	12
Springfield	0	------	0	0	2	2	0	1	0	7	21
Michigan:											
Detroit	2	------	0	29	2	21	0	10	0	79	232
Flint	1	------	0	0	8	0	0	1	0	1	38
Grand Rapids	0	------	0	0	0	2	0	0	0	21	36
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	0	8
Madison	0	------	0	3	0	1	0	0	0	1	12
Milwaukee	0	------	1	26	1	5	0	3	0	7	69
Racine	0	------	0	2	0	5	0	0	0	3	10
Superior	1	------	0	0	0	1	0	0	0	0	10
Minnesota:											
Duluth	0	------	0	0	1	0	3	0	0	1	20
Minneapolis	2	------	0	0	2	4	0	1	0	0	86
St. Paul	0	------	0	0	0	5	0	1	1	0	55

[1] Figures for Barre and Shreveport estimated; reports not received.

City reports for week ended August 31, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	------	------	0	------	0	0	------	0	0	------
Davenport	0	------	------	0	------	1	0	------	0	0	------
Des Moines	16	------	0	0	0	1	0	0	0	0	29
Sioux City	0	------	------	0	------	0	0	------	1	0	------
Waterloo	0	------	------	0	------	1	0	------	0	1	------
Missouri:											
Kansas City	0	------	1	2	3	4	0	1	2	2	79
St. Joseph	0	------	0	0	1	0	0	0	0	1	19
St. Louis	3	------	0	0	7	4	0	5	0	13	181
North Dakota:											
Fargo	0	------	0	0	1	0	0	0	0	0	8
Grand Forks	0	------	------	0	------	0	0	------	0	1	------
Minot	0	------	0	0	0	0	0	0	0	0	5
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	1	------
Sioux Falls	0	------	0	0	0	0	0	0	0	0	9
Nebraska:											
Lincoln	0	------	------	0	------	1	0	------	0	3	------
Omaha	0	------	0	0	1	0	0	2	1	1	45
Kansas:											
Lawrence	0	------	0	0	1	0	0	0	0	0	4
Topeka	0	------	0	2	1	2	0	3	0	4	19
Wichita	0	------	0	0	3	1	0	1	2	0	37
Delaware:											
Wilmington	0	------	0	0	0	0	0	0	0	1	28
Maryland:											
Baltimore	1	2	0	2	4	1	0	7	0	58	154
Cumberland	0	------	0	0	0	0	0	0	0	0	14
Frederick	0	------	0	0	0	0	0	0	0	0	1
Dist. of Col.:											
Washington	2	------	0	3	4	4	0	17	4	9	149
Virginia:											
Lynchburg	2	------	0	0	1	0	0	0	0	1	8
Norfolk	0	------	0	0	2	0	0	0	0	3	21
Richmond	0	------	0	0	0	0	0	1	0	0	31
Roanoke	0	------	0	0	1	0	0	0	0	7	8
West Virginia:											
Charleston	0	1	0	0	0	0	0	0	0	0	12
Huntington	0	------	0	0	0	0	0	0	0	0	2
Wheeling	0	------	0	0	0	1	0	0	0	2	17
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	3	------
Raleigh	0	------	0	0	1	0	0	2	0	0	17
Wilmington	1	------	0	0	2	1	0	0	0	0	10
Winston-Salem	1	1	0	0	0	0	0	0	0	20	21
South Carolina:											
Charleston	0	2	0	10	4	0	0	1	0	0	26
Florence	0	------	0	0	2	0	0	0	0	0	16
Greenville	0	------	0	0	1	0	0	0	0	1	8
Georgia:											
Atlanta	0	------	0	0	1	1	0	6	2	2	89
Brunswick	0	------	0	0	0	0	0	0	0	0	6
Savannah	1	------	0	0	0	0	0	5	0	2	28
Florida:											
Miami	0	3	0	0	4	0	0	1	0	0	25
Tampa	1	------	0	1	1	0	0	0	0	0	28
Kentucky:											
Ashland	0	1	0	0	0	0	0	1	1	0	9
Covington	0	------	0	0	0	0	0	2	0	0	18
Lexington	0	------	0	10	3	0	0	1	0	2	14
Louisville	1	------	0	0	1	1	0	4	1	8	65
Tennessee:											
Memphis	0	------	2	0	0	3	0	8	4	13	90
Nashville	0	------	0	0	0	1	0	2	0	7	56
Alabama:											
Birmingham	0	2	0	4	2	2	0	2	3	0	58
Mobile	0	------	0	0	1	1	0	1	0	0	24
Montgomery	1	------	------	0	------	0	0	------	0	1	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	0	------	------	0	------	0	0	------	0	0	------
Louisiana:											
New Orleans	2	------	0	0	11	0	0	9	2	3	148
Shreveport	------	------	------	------	------	------	------	------	------	------	------
Oklahoma:											
Oklahoma City	0	------	0	0	5	2	0	1	0	0	49
Tulsa	0	------	0	0	1	0	0	2	2	1	21

City reports for week ended August 31, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Texas:											
Dallas	0	------	0	1	1	1	0	0	1	4	57
Fort Worth	0	------	0	3	2	0	0	0	1	17	30
Galveston	0	------	0	0	0	0	0	0	2	0	15
Houston	1	------	0	1	7	0	0	7	2	2	89
San Antonio	1	------	0	0	4	0	0	7	2	5	58
Montana:											
Billings	0	------	0	1	0	1	0	0	0	1	7
Great Falls	0	------	0	3	0	0	0	0	0	0	9
Helena	0	------	0	0	0	0	0	0	0	0	1
Missoula	0	------	0	0	0	2	0	0	0	0	11
Idaho:											
Boise	0	------	0	0	1	0	0	0	0	0	8
Colorado:											
Colorado Springs	0	------	0	0	1	0	0	1	0	0	10
Denver	0	------	0	3	2	1	0	2	0	3	87
Pueblo	0	------	0	0	0	0	0	0	1	0	4
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	10
Utah:											
Salt Lake City	0	------	0	3	0	2	0	0	0	18	27
Washington:											
Seattle	0	------	1	2	2	1	0	2	1	7	84
Spokane	0	------	0	0	0	0	0	0	0	0	30
Tacoma	0	------	0	0	1	0	0	1	0	0	27
Oregon:											
Portland	0	------	0	0	0	3	0	1	0	0	73
Salem	0	------	------	0	------	0	0	------	0	2	------
California:											
Los Angeles	2	1	0	6	1	10	0	13	3	47	280
Sacramento	0	------	0	0	2	0	0	2	0	1	28
San Francisco	0	1	0	0	6	0	0	6	0	14	152

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Maine:			
Portland	0	0	1
Massachusetts:			
Worcester	0	1	1
Rhode Island:			
Providence	0	0	1
New York:			
New York	0	0	10
Rochester	0	0	1
New Jersey:			
Camden	0	0	1
Newark	0	0	1
Pennsylvania:			
Philadelphia	0	0	9
Pittsburgh	1	0	2
Scranton	0	0	1
Ohio:			
Cincinnati	0	0	1
Cleveland	0	0	2
Toldeo	0	0	1
Indiana:			
Fort Wayne	0	0	6
Indianapolis	0	0	3
Muncie	0	0	5
South Bend	0	0	2
Illinois:			
Chicago	0	0	9
Michigan:			
Detroit	0	0	6
Flint	0	0	1
Grand Rapids	0	0	4
Minnesota:			
Minneapolis	0	0	3
Iowa:			
Cedar Rapids	0	0	2
Davenport	0	0	1
Des Moines	0	0	4
Iowa—Continued.			
Sioux City	0	0	3
Waterloo	0	0	11
Missouri:			
Kansas City	1	0	11
South Dakota:			
Aberdeen	1	0	0
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	7
Kansas:			
Topeka	0	0	1
Wichita	0	0	4
Maryland:			
Baltimore	1	0	1
Virginia:			
Norfolk	0	0	2
Richmond	0	0	1
West Virginia:			
Huntington	0	0	3
Kentucky:			
Louisville	0	0	1
Alabama:			
Birmingham	1	0	1
Louisiana:			
New Orleans	0	0	2
Oklahoma:			
Oklahoma City	1	0	0
Texas:			
Houston	0	0	1
Montana:			
Billings	0	0	1
Helena	0	0	2
Missoula	0	0	3
Washington:			
Seattle	0	0	1
Tacoma	0	0	1
California:			
Los Angeles	0	0	4

Encephalitis, epidemic or lethargic.—Cases: Newark, 1; Philadelphia, 1; Waterloo, 1; Omaha, 2; Topeka, 2; San Francisco, 1.

Pellagra.—Cases: Chicago, 1; Savannah, 2; Dallas, 1.

Typhus fever.—Cases: Atlanta, 2; Brunswick, 1; Mobile, 1; Montgomery, 1; New Orleans, 2; Dallas, 2; Houston, 1.

FOREIGN REPORTS

CUBA

Provinces—Notifiable diseases—4 weeks ended July 20, 1940.—During the 4 weeks ended July 20, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		2	2	10		12	26
Diphtheria		9	1			4	14
Hookworm disease				1			1
Leprosy				2	1		3
Malaria	3	2		7		37	49
Measles		6		1		5	12
Poliomyelitis		5					5
Scarlet fever				1			1
Tetanus infantile	1						1
Tuberculosis	14	71	12	47	9	30	183
Typhoid fever	18	138	15	37	24	37	269

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of August 30, 1940, pages 1594–1597. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Foochow.—Cholera has been reported in Foochow, China, as follows: For the month of August 1940, 29 cases, 14 deaths; September 3 and 4, 1940, 11 deaths.

Plague

Tunisia—Tunis.—For the period August 31 to September 5, 1940, 2 cases of plague were reported in Tunis, Tunisia.

United States—Wyoming—Sublette County.—A report of plague infection in Sublette County, Wyo., appears on page 1747 of this issue of PUBLIC HEALTH REPORTS.

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

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CONTENTS

Public Health Reports

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ORDER ESTABLISHING THE HEALTH AND MEDICAL COMMITTEE IN THE COUNCIL OF NATIONAL DEFENSE

On September 19, 1940, the President approved the following order, establishing the Health and Medical Committee to advise the Council of National Defense and to coordinate health and medical activities affecting national defense.

Pursuant to the authority vested in it by section 2 of the Act of August 29, 1916 (39 Stat. 649), the Council of National Defense, with the approval of the President, hereby establishes as a subordinate body to the Council a committee to be known as the Health and Medical Committee. The Committee shall consist of the following members: Dr. Irvin Abell, who shall be Chairman, the Surgeon General of the Army, the Surgeon General of the Navy, the Surgeon General of the Public Health Service, and the Chairman of the Division of Medical Sciences of the National Research Council. Vacancies occurring in the membership of the Committee shall be filled by appointment by the Council with the approval of the President. The members of the Committee and of such subcommittees as may be formed by the Committee shall serve as such without compensation but shall be entitled to actual and necessary transportation, subsistence, and other expenses incidental to the performance of their duties.

It will be the responsibility of the Committee to advise the Council of National Defense regarding the health and medical aspects of national defense and to coordinate health and medical activities affecting national defense. In carrying out its functions, the Committee may (*a*) utilize, to the extent that such facilities are available for such purpose, the laboratories, equipment and services of the Medical Departments of the Army and Navy, of the Public Health Service, and of other Government institutions; and (*b*) within the limits of the appropriations allocated to it, contract with and transfer funds to such institutions, and enter into contracts and agreements with individuals or educational or scientific institutions for studies, experimental investigations, and reports.

The Committee shall promulgate rules and regulations for the conduct of its work, which rules and regulations shall be subject to the approval of the Council and the President.

PUBLIC HEALTH IN THE NATIONAL DEFENSE PROGRAM [1]

The current program for national defense thus far developed has already thrown into relief many problems pertaining to public health and physical fitness. More than ever before the Nation has recognized health as an essential element of preparedness. This is attested to by the phrase "maintenance of public health, safety, or interest" which is used repeatedly throughout the Selective Training and Service Act of 1940. Inasmuch as general measures for national defense have moved forward at a rapid rate since May 9, 1940, when the State and Territorial health officers met with the United States Public Health Service in annual conference, it seemed urgent that the group be called together again to review plans and agree on lines of action. Such a special conference, the proceedings of which are herein reviewed, took place in Washington, D. C., September 16 and 17, 1940. In addition to the State and Territorial health officers and members of the United States Public Health Service, it was attended by personnel of the National Advisory Health Council, officials of the Army, the Navy, and other branches of the Federal Government, also representatives of voluntary health agencies and of the several professional organizations concerned with different elements of public health and medical service.

When calling the meeting to order, Surgeon General Thomas Parran outlined the purposes of the Conference and enumerated certain major health problems in connection with national defense to which the group might direct its attention. His address is quoted in full, as follows:

The most impelling problem which we face today is that of maintaining the safety of this country and its institutions. For their aggressive defense, we are gearing up governmental methods, mobilizing resources and manpower.

For the first time in all history, world events have thrust upon us the concept of a total war. In preparing a total defense, all factors ultimately rest upon the one fundamental resource of the country, *manpower*. Medicine and public health, through the centuries, have been devoted to the conservation of manpower and its socially constructive use.

Pursuant to the Act of July 1, 1902, you have been called today to meet for the consideration of ways and means by which we may take the first steps, through coordinated Federal and State action, to conserve and utilize the vital resources of our country for national defense.

In addition to the State and Territorial health officers and our National Advisory Health Council, I have invited the representatives of other Federal agencies concerned and of professional and voluntary agencies. This is desirable because of the complexity of many of the problems with which we are faced. Also, we need now, as never before, an integrated effort on the part of all agencies which represent the purpose of our citizens to attain personal and national health.

[1] Summary of proceedings, Special Conference of State and Territorial Health Officers with the United States Public Health Service, Washington, D. C. September 16–17, 1940.

The Federal Government has planned a closer coordination of health activities to promote national defense than we have known before. We have now a coordination of civilian health problems with social welfare, children's problems, nutrition, and other consumer interests under one of the seven members of the Advisory Commission to the Council of National Defense. We may anticipate, soon, a further coordination of medico-military and health-defense problems as a major preparedness measure.

The immediate problems which you have been called to consider are listed in the program for detailed discussion. I shall refer to them briefly.

The Selective Training and Service Act of 1940 contemplates the registration of about 16,500,000 men, the immediate physical examination of 2 to 4 million, and the induction into military training of several hundred thousand. There is a clear necessity for maintaining a balance between facilities to care for the civil and industrial needs on the one hand, and the needs of the military services on the other. This leads to considerations of recruitment policy; the status of key personnel in essential health and medical service and training programs to insure an uninterrupted output of professional personnel for both civil and military demands.

Among the 16,500,000 registrants, there will be found countless physical defects and many cases of communicable diseases. For example, a large proportion of the acute syphilis is among this age group. Here will be 300,000 foci of infection going into the registration booths. Have we the energy and the vision to offer a blood test to these men? It is a major opportunity to mobilize all of our public health and medical effort to find and stamp out perhaps the larger portion of this menace to national fitness.

We shall have much to do in providing isolation and care for the many active cases of tuberculosis which will be found on draft examinations. We should do it for trachoma.

Even though our physical status may be better than in 1917 and 1918, we know that a large segment of the registered population will be disqualified for military service because of physical defects, many of which are remediable. What are the ways and means in which public health and medical agencies may contribute to their rehabilitation?

Of immediate concern, also, are the sanitary and health emergencies created by the mobilization and military maneuvers of large bodies of troops in many States. The situation raises questions of military necessity, Federal versus State relationships, and even suggests the need to consider some plan for regionalized administration.

Industrial mobilization and expansion coincides with military mobilization and expansion. Although we have made progress, we still are far from solving all the long-time problems associated with occupational accidents, disease, and physical impairment among workers in ordinary times. Defense preparations have greatly augmented these problems, and created acute new ones.

We are not yet geared to protect men working in the new and hazardous processes being introduced nor are we prepared to alleviate the burdens upon the housing, medical, and health facilities of the community imposed by large population shifts to expanded industries.

Although more than 30 State industrial hygiene units have been established during the past 4 years, most of them consist merely of an organization nucleus inadequate to meet current problems effectively. Just as we now have insufficient air, naval, and land forces to meet every threat to our safety, so we have also insufficient forces trained in industrial medicine, public health, and sanitation to serve our military, civilian, and industrial needs. One of the narrowest bottlenecks is the shortage of men trained for industrial medical service. Whose

responsibility is it to meet this need? If our industrial machines are the most efficient in the world, the men and women who operate them should have a comparable efficiency.

Further, I would call to your attention the status of the 500,000 young people between the ages of 18 and 21 to be employed by the National Youth Administration, many of whom are being trained in skills needed by defense industries. The boys will be of military age soon. If we do our part now, both industry and the armed forces will be spared some of their present problems. The National Youth Administration, with the help of the Public Health Service, is developing a health program to be carried out in the several States. If it is to be successful, State and local health agencies and the medical and dental professions must participate actively.

And finally, may I suggest that the immediacy of these (and any other matters to be discussed) should not prevent your viewing them at long range. It is true that the world picture changes almost overnight, and that overnight our own needs may become much more acute. From my own point of view, however, we should plan for the long haul. It does not seem likely that the situation in which we find ourselves will be resolved in 6 months or a year—perhaps not for many years. Nevertheless, we have this enduring satisfaction, that what we do here, if it be well done, is imperative for safety in war but is even more greatly productive for permanent peace. Whatever the future holds for us, our effort *cannot* be wasted. We build for a strong, a vigorous America, eternally ready for tomorrow.

Program

The following subjects were presented to the Conference for consideration:

(1) Health services for National Youth Administration enrollees.

(2) Physical rehabilitation of registrants disqualified for duty with the armed forces.

(3) Serologic tests of registrants for military service.

(4) Pertinent needs in industrial hygiene.

(5) Health aspects of civil defense.

(6) Control of selected communicable diseases.

(7) Health administration problems arising out of mobilization.

(8) Census of public health personnel and facilities.

(9) Administration of the Selective Training and Service Act of 1940.

This agenda was designed first to acquaint the conferees with those major problems that are now receiving or are likely to engage the attention of the several agencies that contribute in one way or another to general health programs; and second, to promote a clear understanding of the possible fields for cooperative endeavor between the Federal officials, including those of the Army and Navy, and the State health officers, and between constituted authorities and members of the professions. Since the present mobilization is being conducted in times of peace, appropriate consideration was given to health problems arising out of mobilization, but not directly of a military character. Some of the subjects discussed were projected

against this background of a peacetime mobilization. Other items on the program more intimately concerned with military and industrial preparedness are pertinent in time of peace as well as during a state of war.

HEALTH SERVICES FOR NATIONAL YOUTH ADMINISTRATION ENROLLEES

Mr. Aubrey Williams, the Administrator of the National Youth Administration, outlined the purpose and scope of the general program operated under his direction. There are two types of youth employed, the in-school and the out-of-school. Persons eligible for employment on the out-of-school work program are the ones who should receive immediate attention in anticipation of mobilization for national defense. The youths who are now between the ages of 18 and 21 will soon be subject to registration under the Selective Training and Service Act.

Heretofore there has been no general policy at the Federal level regarding health measures for these persons, although some State agencies have made an effort to secure physical examinations on enrollees. It is felt that a practical program to improve the health and physical fitness of out-of-school young people employed by the National Youth Administration would be beneficial to the individuals and would add important manpower for industrial and military purposes. Such a program is being developed by the National Youth Administration in cooperation with the United States Public Health Service. The details of this program for out-of-school enrollees was presented by C. E. Rice, Surgeon, United States Public Health Service, who has been loaned to the National Youth Administration to have general supervision over its health activities. The program will include physical examination, physical rehabilitation by a medical service through the medical and dental professions, and promotion of health education, physical education, and environmental sanitation. State health departments will be asked to serve as co-sponsors of State-wide health projects in their respective areas.

PHYSICAL REHABILITATION OF REGISTRANTS DISQUALIFIED FOR DUTY WITH THE ARMED FORCES

This subject was introduced by George St. J. Perrott, Chief, Division of Public Health Methods, National Institute of Health, with a review of the types and incidence of disabilities found among draftees in the last World War. Data derived from the study of the second million records of physical examinations were selected as a base since by that time examination procedures had become more efficient and standardized. In this sample 23.4 percent were rejected (including rejections by local boards), 3.7 percent put in a limited-service classification, and 54.9 percent had one or more defects.

Of the defects found, flat feet and other foot defects ranked highest, comprising nearly one-fourth of all defects. Other orthopedic conditions accounted for another 10 percent and hernia or enlarged inguinal rings for about 9 percent. Together this group of mechanical defects constituted over 40 percent of all defects found.

Other defects found with the percentage indicating their relative importance were given as follows: Venereal diseases, 8 percent; cardiovascular-renal group, 7 percent; diseased tonsils, 6 percent; underweight, 4 percent; defective teeth, 3 percent; goiter, 2 percent; and varicose veins and varicocele, 1 percent.

Attention was called to the fact that the foregoing figures refer to all men whether or not the defect was a cause of rejection and are expressed in terms of total defects. Of perhaps more importance are the percentages of defects expressed in terms of men examined. Such figures indicate that 16 percent of the men had flat feet; 7 percent other orthopedic defects; 6 percent, hernia; 6 percent, venereal disease (1 percent, syphilis and 5 percent, gonorrhea); 7 percent, defect of eye or ear; 5 percent, cardiovascular-renal defects; 4 percent, diseased tonsils; nearly 3 percent, tuberculosis; 2 percent, defective teeth; 1 percent, goiter; and about 1 percent, varicose veins. The total indicates a rate of 68.7 defects per 100 men examined.

It was pointed out that there appeared to be regional variations in the incidence of defects and in the predominant types of defects found.

It was estimated by Mr. Perrott that under the terms of the Selective Training and Service Act about 16,500,000 men would be registered; of these about 5,500,000 ultimately might receive a physical examination, and around 1,500,000 would be rejected or placed in the limited-service class because of physical disability. Further estimates were made of the number of specified types of disabilities, but broadly speaking about 60 percent will fall in three groups: Defects of eye and ear; the mechanical defects; and the cardiovascular-renal group. In conclusion it was estimated by Mr. Perrott that a program of rehabilitation would cost at least $25,000,000.

The health of the men accepted for military training is the responsibility of the several branches of the armed forces; the problem as placed before the Conference was whether or not public health agencies have responsibilities in relation to physical rehabilitation of the rejected men.

Possible programs for physical rehabilitation of registrants disqualified because of defects were presented by Surgeon E. R. Coffey, Assistant Chief, Division of Domestic Quarantine. Comment made covered the social, economic, and military importance of correcting remediable defects as well as the value of that service to the individual. For some persons with physical defects medical service would have little to offer, while for others, surgical or medical skill

would afford a complete return to physical fitness. Between the two extremes would be a wide range of border-line cases. A program designed to correct remediable defects would of course require careful planning and cooperation among all agencies concerned.

Tuberculosis as a problem among those rejected for military service was discussed by Kendall Emerson, Managing Director of the National Tuberculosis Association. Dr. Emerson, in referring to Mr. Perrott's estimate of 140,000 men to be rejected because of tuberculosis, pointed out that some of these would be cases already known to health departments, while others would have latent tuberculosis, not requiring treatment. However, there would undoubtedly remain a number so large that it would severely tax our present sanatorium facilities to furnish treatment to all who might need it. The size of the problem should not be construed so as to relieve the health authorities of responsibility for seeking adequate care for the discovered cases. It was further pointed out that the victim of tuberculosis needs more than physical rehabilitation. He frequently needs social and vocational adjustment. The total task of rehabilitation is not complete until the patient can again become economically self-sufficient. This latter comment might well apply to rehabilitation of persons with defects other than tuberculosis.

In the general discussion of the topic of physical rehabilitation it was pointed out that the cause for rejection is confidential and may not be available to health authorities. Further discussion centered about ways and means of effecting a program of physical rehabilitation. It was felt that considerable difficulty would be experienced in locating or following persons to secure the correction of defects and that some would prefer to retain their defects. However, one health officer expressed the opinion that if an opportunity were given to have remediable defects corrected without charge to the individual, the majority would accept treatment. All agreed that irrespective of whatever plan might be developed in connection with this problem, it should operate on a voluntary basis.

SEROLOGIC TESTS OF REGISTRANTS FOR MILITARY SERVICE

Senior Surgeon O. C. Wenger, United States Public Health Service, gave a challenging presentation of the syphilis problem among registrants and outlined a case-finding program of proportions never before contemplated. It is estimated that there are about 300,000 persons with syphilis among the 16,500,000 men who will register under the Selective Training and Service Act of 1940. Each one of the 300,000 individuals is a focus of infection which will serve as a link in a chain of new infections. Discovery of syphilitics among this number of men and their placement under adequate treatment would greatly reduce the further spread of the disease. The military importance of such a

program is apparent when it is recalled that during the last war venereal diseases ranked third as a cause of loss of time in the Army, being exceeded only by battle casualties and influenza.

The plan of action to be followed in effecting the collection and serologic examination of blood specimens on registrants was delineated. Briefly, it involves a cooperative effort on the part of private physicians and health agencies in the organization of a number of teams to draw blood specimens at the time of registration from those who may volunteer. As far as possible every registration point will be covered. State and other health department laboratories are expected to perform the serologic examinations.

Discussion brought out a number of practical points and administrative difficulties such as the magnitude of the task to be accomplished in a very short time; inadequate number of technicians available to perform the tests; insufficient stock of specimen tubes; and lack of proper storage facilities for specimens awaiting examination. Despite the many obstacles which lie ahead, it seemed that the health officers were anxious to accomplish all that might be done within the limits imposed by circumstances.

PERTINENT NEEDS IN INDUSTRIAL HYGIENE

The importance of protecting and improving the health of workers in essential industries as a part of a general mobilization was emphasized by Paul A. Neal, Chief, Division of Industrial Hygiene, National Institute of Health. To accomplish the desired results will necessitate a considerable expansion of present industrial hygiene activities. The needs may be roughly divided into two categories: (1) Additional funds and personnel to be utilized by the United States Public Health Service and State health departments in aiding industry to control industrial hazards, including the training of personnel; and (2) essential medical and nursing services for employees.

Dr. Neal outlined a specific industrial hygiene program which is summarized as follows:

1. Investigation and control of specific industrial hazards. Some of the industrial hazards to be investigated and controlled are dusts, fumes, gases, vapors, and mists, defective illumination and ventilation, noise, excessive temperatures and humidities, abnormal pressures, and injurious posture.
2. Advice to industrial managers and others on the location of new plants and on the renovation of old plants, in the interest of health and safety.
3. Promotion of physical examinations and medical services to be provided by industry.
4. Preparation and dissemination of information on various toxic materials and processes, including approved designs of exhaust systems for the control of atmospheric contaminants.
5. Appraisal of fatigue status in relationship to requirements of the national defense program.

6. Determination of methods for the absorption of handicapped persons into vital industries for national defense.
7. Promotion of measures for the control of syphilis, tuberculosis, and other communicable diseases among industrial workers; in other words, a general adult health program for the worker.

General discussion by the members of the Conference showed quite clearly that all the health officers agreed that industrial hygiene deserved especial attention. The health officer of one State which has only a rudimentary industrial hygiene unit felt that much has been accomplished by the utilization of the facilities of all other agencies, official or voluntary, whose activities touch on industrial hygiene. Most State health officers, however, insisted that personnel for this activity should be developed beyond the skeleton type of organization.

HEALTH ASPECTS OF CIVIL DEFENSE

The military forces are primarily responsible for repelling armed forces; the major responsibility for civil defense rests with the communities, acting through their local governments. These points were made by Surgeon J. A. Crabtree of the United States Public Health Service in introducing this topic.

Among the problems which will present themselves to civil authorities are emergency police measures, fire protection, safeguards for utilities, transportation, and provision of special health and medical services in the event of disaster. In certain European countries protection of local residents against gas attacks and air raids, and the evacuation of refugees are functions of civil authorities.

In discussing this topic Dr. DeKleine of the American Red Cross placed special emphasis on the point that effectiveness of the whole effort of civil defense will depend very largely upon the thoroughness with which residents of each locality are trained and disciplined.

CONTROL OF SELECTED COMMUNICABLE DISEASES

Dr. W. T. Harrison, Chief of the Division of Biologics Control of the National Institute of Health, pointed out that only one preventive vaccine, tetanus toxoid, has been perfected since the last World War. Research is being carried forward on influenza but at present the value of preventive measures for this disease is not yet sufficiently proven to warrant their use among military personnel or the general population.

The men newly inducted into the armed forces will receive immunizing vaccines for smallpox, typhoid, and tetanus. Liquid tetanus toxoid will be used in preference to the precipitated type, because the latter has given rise to more severe side-reactions than the former. Dr. Harrison said that not a single case of tetanus was reported among men of the French Army who received the liquid tetanus toxoid.

Reference was briefly made to other communicable diseases, such as measles, mumps, and diphtheria. Measles and mumps are apt to occur when large numbers of young men are gathered together in the relatively close association of military training, particularly if a high proportion of the men are from rural areas. Although an immunizing agent is available for the prevention of diphtheria, this disease is not considered of sufficient importance by the military authorities to warrant the administration of diphtheria toxoid to all troops.

In the discussion of the control of communicable diseases, assurance was given that there is a sufficient supply of antipneumococcic serums to meet all needs, particularly since the newer chemotherapeutic agents have reduced the demand for serum in the treatment of pneumonia. Malaria may prove a problem in some of the southern training centers; however, there is at least a 1-year supply of quinine in stock and substitute drugs can be readily manufactured by American firms.

HEALTH ADMINISTRATIVE PROBLEMS ARISING OUT OF MOBILIZATION

This topic was presented by both public health and military representatives. Assistant Surgeons General J. W. Mountin and R. A. Vonderlehr of the Public Health Service, Colonel C. C. Hillman of the Army, and Commander C. S. Stephenson of the Navy participated. The problems discussed related to the health of both civilians and the armed forces as it may be affected by concentration of people for military training or industrial production.

Special health problems are certain to arise in rapidly expanding industrial centers as well as in the zones surrounding cantonments and in maneuver areas. Rapid increase in population will tax the milk supply and the water supply as well as sewage-disposal facilities and other services. Many new industrial plants and most of the cantonments will undoubtedly be built in suburban areas adjacent to towns of moderate size, thus necessitating complete installation of public utilities or marked enlargement of those already in use. Such new installations or additions should conform to accepted health engineering practice.

The health of civilians in the community surrounding a cantonment influences the health of the men in camp. This is particularly true of venereal disease. Control of venereal disease in extra-cantonment areas will be a major problem again, as it was during the last war.

Those in attendance took the position that protection of health in extra-cantonment areas is primarily the responsibility of the official health agencies. Usually it will be necessary to supplement the resources of local health departments so that the activities may be expanded to meet the increased load. Localities quite appropriately will expect State and Federal health agencies to assist them in meeting

the added burden by financial grants-in-aid and by the temporary assignment of trained personnel.

Warren J. Vinton, of the United States Housing Authority, spoke on the problem of housing in areas of industrial and military concentration and commented on the relation between housing and health. He urged health officers not to overlook the opportunity to improve health through better housing and to insist on adequate construction that might later replace substandard housing. In this connection Commander Stephenson said that the Navy is already faced with the problem of housing employees of the several Navy yards.

CENSUS OF PUBLIC HEALTH PERSONNEL AND FACILITIES

The various aspects of this topic were presented by persons familiar with and working in the several fields as follows:

Physicians, R. G. Leland.
Dentists, C. Willard Camalier.
Hospitals, C. W. Munger.
Nurses, Pearl McIver.
Engineers, J. K. Hoskins.
Water and sewage plants, J. K. Hoskins.
Laboratories, N. E. Wayson.
Health agencies, J. M. DallaValle.

The Committee on Medical Preparedness of the American Medical Association is now conducting a survey of the membership of the Association to determine qualifications and availability of physicians for military and other types of service under the preparedness program. Dr. Leland reported that satisfactory progress is being made. A special supplemental questionnaire is being sent to those physicians who have engaged in any type of industrial medicine, since there seems to be a scarcity of physicians experienced in industrial hygiene work. Medical schools are being canvassed to determine the availability of the members of their teaching staffs. The information obtained by the Committee on Medical Preparedness will be available to military authorities.

Dr. C. Willard Camalier, Chairman of the Committee on Medical Preparedness of the American Dental Association, reported that a canvass of dentists similar to that of physicians is in progress.

As a result of a recent survey the American Hospital Association now has available for its member hospitals data which describe the personnel and facilities that may be made available for use in connection with mobilization without disrupting the usual services of individual hospitals. The hospitals have also indicated the number and types of beds that may be made available in emergencies. This presentation was made by C. W. Munger, chairman of the Federal Relations Committee of the American Hospital Association.

A Nursing Council for National Defense, organized about two months ago, was described by Pearl McIver, Senior Nursing Consultant, of the United States Public Health Service. This Council is composed of the presidents of the national nursing organizations, a representative of the American Red Cross, and representatives of each of the Federal nursing services. Among the first projects proposed by this Council was a nation-wide census of registered nurses. Schedules are now being prepared for distribution through the State societies of the national nursing organizations. The information obtained will indicate whether the nurses are available for military or civilian duty, for full-time or part-time work, in their home communities or elsewhere. The United States Public Health Service has been requested to serve as official sponsor of the survey.

There is no readily available information on sanitary engineering personnel, said J. K. Hoskins, Senior Sanitary Engineer of the United States Public Health Service, who pointed out that information on sanitary engineers similar to that being obtained for other types of professional personnel should be secured.

The United States Public Health Service has been responsible for certification of water supplies used in interstate traffic for a number of years. Recently a census was inaugurated for all water-purification plants and sewage-disposal systems. Much of the data is already in hand.

The quality and quantity of clinical laboratory services are of importance in determining the adequacy of health facilities in an area. N. E. Wayson, Medical Director, United States Public Health Service, said that such information is not now available. Finally he emphasized that it is important to know how many laboratory technicians can be spared for military service without crippling the laboratories of the country.

Attention of the Conference was again directed by J. M. Dalla Valle, Associate Sanitary Engineer, United States Public Health Service, to the lack of comprehensive knowledge concerning local health organizations of this country. Among the items on which data should be secured are local health control of food supplies, including milk; housing facilities; refuse and garbage disposal; medical services, including physicians, dentists, hospitals, and clinics; local public health organization; industrial hygiene facilities. It was suggested that this information might be obtained through questionnaires directed primarily to city tax-supported agencies and secondarily to the voluntary and proprietary agencies also operating in the same health jurisdictions.

Committee Reports

COMMITTEE ON HOSPITAL AND MEDICAL CARE

Consideration was given to only three of the many items which might reasonably come to the attention of this Committee.

The first item related to any communicable disease, reportable in the State, that may be found when the physical examination of registrants under the Selective Training and Service Act of 1940 is performed. In this connection the Committee offered the following resolution:

Whereas it is the opinion of the Committee that while regulations for the administration of the Selective Training and Service Act of 1940 provide that the cause of physical rejection may not be made public, this should not be interpreted as relieving the examining physician of the responsibility for complying with provisions of State health law regarding reporting of communicable diseases, including venereal disease and tuberculosis: Therefore be it

Resolved, That prompt steps be taken to include such an interpretation in the Presidential Regulations governing administration of the Selective Training and Service Act of 1940.

The second item concerned the program planned for physical examination and the correction, insofar as possible, of remediable defects among the youth of the Nation who are enrolled for benefits under the National Youth Administration. The Committee endorsed the proposed program in the following resolution:

Whereas the health program to be initiated by the National Youth Administration is planned to promote the health and efficiency of its enrolled youths through the utilization of health and medical facilities which already exist, or may be supplemented by the National Youth Administration; and

Whereas the program as planned seeks the active cooperation of State and local health departments: be it

Resolved, That the Conference of State and Territorial Health Officers endorse the principles and purpose of the National Youth Administration's health program; and,

That the Conference recommend that the State health department serve, when requested, as co-sponsor of such State-wide National Youth Administration health projects.

The last of the three problems considered by the Committee was that of the rehabilitation of men found disqualified for military or naval service by reason of physical defects. The Committee felt that the imperative need of developing and training, as quickly as possible, a suitable reserve for immediate defense should not exclude consideration of the military, economic, and social values accruing from an organized effort to correct remediable defects which have caused rejection. The physically rehabilitated men would make an important addition to the number and efficiency of workers available for employment in essential defense industries, as well as augment the

available manpower for the armed forces. In view of these and other considerations the Committee offered the following resolution:

Resolved, That persons who are otherwise found to be satisfactory and available for induction into the land or naval forces of the United States for training and service as provided by the Selective Training and Service Act of 1940 but who are placed on deferred status because of physical defects or ailments which are readily amenable to treatment and cure may, upon application to the Surgeon General of the United States Public Health Service, be considered for acceptance as beneficiaries of that Service for the correction of such physical defects or ailments.

The Committee contemplated that the Surgeon General of the United States Public Health Service would use his discretion in determining the facilities, institutions, and personnel to be employed in such corrective work and that any nongovernmental facilities that may be used would be reimbursed out of funds made available to the United States Public Health Service for the operation of a program of physical rehabilitation among rejected men who may be eligible to receive treatment.

COMMITTEE ON VENEREAL DISEASE CONTROL

Experience in the last war records that from April 1, 1917, to December 31, 1919, the total number of days lost in the Army was 6,804,818; of this number 3,903,303 were lost because of gonorrhea and 1,929,901 days were accounted for by syphilis. Venereal disease ranked third as a cause of disability, being exceeded only by battle casualties and influenza. Such data as are given above indicate that the control of syphilis is one of the most important health measures in the national defense program.

Syphilis is a disease which is most frequently acquired in early adult life, the age groups which include the men to be inducted into military service under the Selective Training and Service Act of 1940. The broad application of the serologic blood test to this group would consequently result in the discovery of large numbers of men infected with syphilis, and make it possible to apply preventive and curative measures to this group on a basis which has heretofore not been possible.

The Committee recommended that blood specimens for serologic examination be taken on all registrants under the Selective Training and Service Act of 1940 wherever facilities can be made available, if the registrant volunteers. The Committee, realizing the size of the task it set, gave consideration to a plan of cooperation between State and local health departments and the medical profession. The plan is set forth as follows:

1. A team of one or more doctors and nurses to be provided at each registration point and to be responsible for the collection of the specimens. Local and State health departments should be able to obtain the services of the physician through

cooperation with the local and State medical societies and provide the nurses without cost to the Selective Draft Board.

2. The blood specimens, with the identification blank properly filled out, to be sent to the nearest public health laboratory where serologic tests for syphilis are performed. Such laboratories should be notified if possible 10 days or 2 weeks in advance of the approximate dates of registration in order that usual serologic work may be set at a minimum during the registration period.

3. The men whose blood specimens prove to be negative by serologic test should be notified directly regarding the laboratory findings. The men who have positive or doubtful serologic results should be directed by mail to report to the physician or clinic named on the original identification slip, which was forwarded from the collection point to the State laboratory. A positive or doubtful result should be reported to the man's physician or clinic in order that the proper physical examination may be performed to supplement the evidence obtained through serologic examination of the blood and to confirm the diagnosis of syphilis.

4. Individuals found to be infected with syphilis may according to circumstances arrange for treatment either from their own physicians or from public clinics, of which there are approximately 2,500 at various places throughout the United States.

The Committee reported that the above plan has the approval of the subcommittee on venereal disease of the National Research Council and of the Surgeon General of the Army. It was recommended that the American Medical Association be asked to encourage the cooperation of the physicians in private practice and that the cooperation of the American Red Cross and other agencies be solicited.

In order that a more detailed plan might be evolved, the Committee recommended the appointment of a subcommittee for this purpose. This subcommittee is constituted as follows:

Dr. Carl V. Reynolds, *Chairman.*
Dr. J. Lynn Mahaffey, *Member.*
Dr. Lester A. Round, *Member.*
Dr. William F. Snow, *Consultant.*
Dr. O. C. Wenger, *Consultant.*
Dr. Harry Eagle, *Consultant.*

In the absence of a formal resolution by the Committee on Venereal Disease Control, the following memorandum was offered for the record by Dr. Stanley H. Osborn and adopted by the Conference as an amendment to the Report of the Committee on Venereal Disease Control:

The only question at issue is one of funds with which to do the serological work The Committee in suggesting that the State perform the tests, wherever the facilities are available, admits that facilities are not everywhere available. All health officers assembled agreed that a serologic blood test for syphilis on every registrant is desirable; and that we have in connection with registration for selective service an opportunity to do an excellent epidemiologic job on an age group where the disease in an infectious stage is most prevalent. It is further agreed by all State health officers present that the test will be performed on all registrants in all States provided funds can be made available for this purpose.

COMMITTEE ON PUBLIC HEALTH IN AREAS OF MOBILIZATION

The Committee recognized that our present health organization, developed primarily for peace-time health activities, would require expansion and possibly some change in administration to meet the increased duties incident to military and industrial mobilization.

Insofar as they are able States and local communities where military or industrial developments take place should expand and perfect their health organization and services to meet the situation. It was the opinion of the Committee, however, that the Federal Government should supplement the efforts of States and communities according to local needs. Since the problems to be met will vary from time to time and shift from one locality to another it is believed that the necessary fluidity could be obtained to best advantage if necessary funds were made available to the United States Public Health Service for the direct employment of personnel, the purchase of supplies, and the construction of needed facilities. The personnel, supplies, or facilities so provided should supplement and be integrated with those of State and local health organizations.

After consideration of these and other factors involved, the Committee made the following recommendations:

1. That administrative control and supervision of public health in areas adjacent to military and industrial mobilization centers be under the direction of the State and local health agencies operating with the advice and assistance of the United States Public Health Service.
2. That minimum requirements for environmental sanitation and communicable disease control be formulated by the United States Public Health Service for the guidance of State and local health authorities in the mobilization areas.
3. That coordination of activities pertaining to housing, industrial hygiene, and sanitation be immediately effected by the United States Public Health Service with existing governmental and nonofficial agencies, in order that State and local health authorities may be aided in establishing proper measures for the protection of the health of the civil population in areas affected by national defense measures.
4. That the United States Public Health Service be urged to secure the necessary funds to reinforce existing State and local facilities for efficient and expeditious inauguration and operation of the afore-recommended emergency health activities.
5. That the resolution presented by the Massachusetts State Department of Health be approved in accordance with the condensed text herewith:

To avoid the creation of hazards to the public health of populations in the vicinity of military and naval bases, training areas, and war industries plants, by reason of endangering public water supplies or by the discharge of inadequately treated domestic or industrial sewage from such centers, and;

To enable the State health departments, as charged by law, to maintain definite standards of safety for public water supplies and adequacy of treatment of domestic and industrial sewage for the protection of the public health;

We request that the Surgeon General of the United States Public Health Service cause to be brought to the attention of the responsible heads of the defense agencies—war, naval, and industrial—the necessity for prompt adoption of procedures whereby the public water supply and waste-disposal facilities of

these concentrations of forces of the national defense program will conform to the standards of the department of health of the State in which such facilities may be located.

COMMITTEE ON PROFESSIONAL EDUCATION AND QUALIFICATIONS

The Committee reiterated its desire to emphasize the need for recruiting and training of all types of personnel engaged in the several fields of public health, both professional and technical, and for the strengthening and broadening of the services to be rendered by the teaching institutions which will perform this task.

The resolution adopted by the Committee on Medical Preparedness of the American Medical Association on July 19, 1940, was considered. This resolution concludes as follows:

Resolved, That the Committee on Medical Preparedness of the American Medical Association recommend to the National Defense Commission that the necessary funds be furnished to the United States Public Health Service to provide the necessary training of physicians, chemists, mechanical engineers and other professional personnel in order to cope with the industrial hygiene problem in the present national emergency.

The Committee approved the sentiment expressed in the above resolution and suggested that the same principle be applied in other fields of public health, particularly that of environmental sanitation where the need may be found to be of exceptional importance.

COMMITTEE ON FEDERAL RELATIONS, STATE AND PROVINCIAL HEALTH AUTHORITIES OF NORTH AMERICA

The Committee gave careful consideration to the problems arising or that threaten to arise in State, regional, and local departments of public health throughout the United States from the call to active service of certain professional members of their staffs who hold reserve commissions in the Army, Navy, and Marine Corps, and who are highly trained and specialized in the field of public health and, therefore, essential for the protection of the health of the communities which they serve.

That measures for the national defense are of primary importance was given full recognition by the Committee. The Committee expressed the conviction of every member of the Conference that any action that may be deemed necessary by those in charge of the national defense program must and should receive complete compliance and support.

After consideration of the many problems involved, the Committee passed the following resolution:

Whereas the Conference of State and Provincial Health Authorities of North America is of the opinion that adequate protection of the health of the civilian

population is essential for the successful prosecution of the program of national defense, and

Whereas there now exists a serious shortage of qualified personnel to cope successfully with existing public health problems, and efforts to reduce this shortage have been during the past four years an expressed policy of the Federal Government, and

Whereas the general program of national defense contemplates a great increase in the number of military mobilization and maneuver areas, a similar expansion of industrial activity and a variety of other developments, all of which will intensify existing civil health problems and some of which will create new problems, and

Whereas the adequate protection of the public health requires the services of certain professional and technical personnel whose training and qualifications can be acquired only through years of intensive study and experience: Therefore be it

Resolved, That in the plans for national defense, the work of the official public health agencies in the United States be recognized as an essential part of the program of national defense, and

Be it further *Resolved*, That the Conference of State and Provincial Health Authorities of North America express to the Surgeons General of the Army and the Navy and to their representatives who have participated in the deliberations of the Conference of State and Territorial Health Officers with the United States Public Health Service its sincere gratitude and appreciation for the information they have given and their comprehensive understanding of public health problems that have been discussed.

Be it further *Resolved*, That the Conference of State and Provincial Health Authorities of North America request the continued interest and cooperation of these officials to the end that such measures may be taken by the military authorities as they may deem necessary to insure that the staffs of State, municipal, and other local health departments may not be depleted and weakened by withdrawals to such an extent that they will be unable to afford the health protection necessary to the civilian population and for the successful prosecution of the measures for the national defense, and

Be it further *Resolved*, That the Surgeon General of the United States Public Health Service be requested to forward a copy of these resolutions to the Surgeon General of the Army and the Surgeon General of the Navy and that he continue to cooperate with them in presenting and seeking the satisfactory solution of problems that may arise from time to time in the field of public health as related to the program of national defense.

A NEW APPARATUS FOR THE ADMINISTRATION OF HELIUM-OXYGEN MIXTURES

By Howard F. Brubach, *Senior Medical Technician*, Laurence R. Crisp, *Instrument Maker*, and Paul A. Neal, *Passed Assistant Surgeon, United States Public Health Service*

The increased use of helium mixed with oxygen as a therapeutic gas has created the need for an apparatus that will permit more economical and at the same time safe administration of such mixtures. An apparatus has been designed which achieves economy through the use of separate tanks of helium and oxygen, and devices have been

contrived which regulate the proportion of the two gases and the volume of flow of the mixture in accordance with the patient's requirements. In addition, the apparatus eliminates one of the principal hazards, that of asphyxia.

HISTORY OF HELIUM

Helium was discovered in the atmosphere surrounding the sun by Lockyer and Janssen in 1868. It was discovered as a constituent of the earth's substance in the mineral cleveite by Ramsey in 1895 (*1*).

Helium is a colorless, odorless, chemically inert gas having a molecular weight of 4 as compared with 28 for nitrogen. At 0° C. and a pressure of 760 mm. of mercury, the density of helium is 0.1785 grams per liter as compared with 1.2506 grams per liter for nitrogen.

Helium was discovered in natural gas in the United States in 1905 by Cady and McFarland (*2*), but it was not until the World War that the production of helium from natural gas was started under the direction of the United States Bureau of Mines (*1*). At that time, production was primarily experimental, and the helium recovered was intended for use by the Army and Navy for lighter-than-air craft.

After the close of the war, the Navy directed the production of helium until 1925, when, through Congressional enactment, the Bureau of Mines was made responsible for the Government's entire helium production and conservation. At present, the United States Bureau of Mines Amarillo Helium Plant, under the immediate direction of C. W. Seibel, is capable of producing 24,000,000 cubic feet of helium per year of better than 98 percent purity at a cost of approximately one cent per cubic foot.

Prior to 1937 helium was available only to Government agencies, but a Congressional enactment approved September 1 of that year (50 Stat. 885) authorized sale by the Bureau of Mines of helium not needed for Government use, upon payment in advance and under regulations approved by the President, for medical, scientific, and commercial use.

Although the helium produced by the Bureau of Mines was originally intended for use in floating balloons and airships, other uses have developed as more has been learned of the properties and adaptability of the gas and as greater quantities of low-cost helium have become available. In 1920, Elihu Thomson and others (*3*) suggested the use of helium-oxygen mixtures in deep-sea diving, and in 1922, Sayers, Yant, and Hildebrand, in their investigation of the controlled oxygen content and greater diffusibility of certain gases in artificial respiratory atmospheres, used helium in making up such atmospheres. In reporting the results of their research, Sayers, Yant, and Hildebrand (*4*) stated: "Helium is without odor or taste and has physical properties which promise to be of interest physiologically and which have been

found to have possibilities of great practical use, especially in making a synthetic atmosphere that will reduce the hazard of caisson disease. The substitution of helium for the nitrogen ordinarily present in the air we breathe has been found to result in an atmosphere which is as respirable as that provided by nature. The results obtained indicate that helium not only has the advantage of being less soluble than nitrogen, but also has the advantage of diffusing more rapidly in the body fluids and tissues which results in rapid elimination of the gas from the tissues during decompression." Further research on the use of helium-oxygen mixtures in diving and caisson operations was made in 1926 by Sayers and Yant (*5*), and since then by Behnke and others (*6*).

The use of helium mixed with oxygen as a therapeutic gas was reported by Barach in 1934 (*7*). He stated: "When helium is substituted for nitrogen in the air, the specific gravity of the mixture (21 percent oxygen and 79 percent helium) is 0.341, as compared to that of air. The helium-oxygen mixture is 66 percent lighter. Since *work* is in general proportional to the density, the pressure required to move helium-oxygen mixtures in and out of the lung should be decidedly less than nitrogen-oxygen mixtures." Barach suggested its use in asthma and in cardiac disease, and in 1935 Maytum, Prickman, and Boothby (*8*) reported its use with good results in four cases of intractable asthma. Since that time helium-oxygen mixtures have been used in the treatment of asthma, status asthmaticus, and obstructive lesions in the trachea and larynx (*9*).

Lovelace, Mayo, and Boothby (*10*), in describing a condition encountered in persons subjected to rapid descent from high elevations in airplanes, stated: "The rate of diffusion of helium is 2.7 times that of nitrogen. The mean velocity of the oxygen molecule at 0° C. and a pressure of 760 mm. of mercury is about 0.425 km. per second, of the nitrogen molecule 0.453 km. per second, and of the helium molecule 1.202 km. per second. In a mixture of helium and oxygen the helium fraction obviously will diffuse more rapidly through the eustachian tube to the middle ear than would the nitrogen of air." This condition (commonly known as "ear block") described by Lovelace, Mayo, and Boothby is also encountered in caisson work and has been successfully treated with helium-oxygen mixtures.

Up to the present time, apparatus for the administration of helium-oxygen mixtures has had several shortcomings. Apparatus which makes use of a single tank of the mixture does not allow variation in the proportion of the two gases in accordance with the patient's requirements. Apparatus in which separate tanks of helium and oxygen are used to make the mixture increases the danger of asphyxia which results from too great a displacement of oxygen by an inert gas such as helium. In fact, when pure helium is breathed in the absence of

oxygen, asphyxia occurs very rapidly with little or no warning. According to Behnke (*11*), healthy individuals at rest or slightly active tolerate for short periods of time a reduction to about 14 percent in the oxygen percentage of the air at sea level. Inasmuch as mixtures of 80 percent helium and 20 percent oxygen are commonly used, the margin is small. Consequently it has been necessary for a person trained in the use of such apparatus to be present at all times during the administration of the mixture. In both types of apparatus the cost of the treatment has been increased by the lack of adequate control over the volume of the mixture flowing through the breathing device.

An apparatus has been constructed whereby oxygen and helium can be drawn from separate tanks, mixed to any desired proportion, and delivered to an oronasal facepiece. Features of the apparatus are (*a*) a safety valve which prevents the flow of helium until the oxygen has been turned on, (*b*) an adjustable valve containing slot orifices which controls the percentages of the gases, and (*c*) an adjustable weight arrangement which makes possible the maintenance of a positive pressure in the facepiece. The third feature was designed to meet the requirements of those physicians who believe that the helium-oxygen treatment of asthma is more effective when a positive pressure is maintained in the facepiece.

DESCRIPTION OF APPARATUS

Separate tanks of oxygen and helium are employed, each equipped with an adjustable reduction valve having a high-pressure gage and a gage for indicating flow pressure. The supply lines from the two tanks are connected to a safety valve which controls the two gases in such a way that the helium cannot flow unless a pressure of oxygen is present. The helium and oxygen lines from the safety valve are attached to opposite sides of an adjustable valve which contains the slot orifices. The gases enter through the orifices at one end of the valve, are combined in the chamber in the core of the valve, and pass out through an opening at the opposite end from the orifices. By rotating the core of the valve by means of a handle mounted on the end of the core, one orifice is opened while the other is being closed. An indicator which is attached to the core of the valve indicates the position of the core on a scale which is attached to the valve body. The scale is calibrated in steps of 1 percent of oxygen from 20 to 25, 5 percent from 25 to 50, and 10 percent from 50 to 100. A stop is mounted on the scale so that the core cannot be turned to a position that will give less than 20 percent oxygen.

The mixture enters the reservoir through an admission valve. The reservoir consists of a cylindrical rubber bellows having a metal dome for the top and a metal plate for the bottom. The excursion of the

dome of the bellows is guided by a rod attached to the top of the dome and passing through a sleeve in the frame. The frame is attached to the bottom plate and forms an inverted U over the bellows. A beam mounted over the reservoir is jointed to an extension of the reservoir frame and also to the top of the bellows' guide rod. By means of a weight that can be slid along the beam, a positive pressure of from 1 to 4 cm. of water can be created in the reservoir. A flexible breathing hose delivers the mixture from an opening in the bottom plate of the reservoir to the facepiece.

Inside of the reservoir a lever arm arrangement, which is connected to the dome and to the bottom plate, operates the admission valve. As the mixture is breathed from the reservoir, the bellows collapse, and as the dome of the bellows reaches the lowest position of its excursion, the lever arm operates an off-center spring which snaps open the admission valve, thus admitting the mixture. When the incoming mixture has raised the bellows' dome to the top of its excursion, the lever arm again operates the off-center spring which closes the admission valve. The admission valve then remains closed until a volume of the mixture has been breathed from the reservoir causing the bellows to collapse again. The admission valve is operated in the manner described so that the orifices in the adjustable valve are given full control of the gas flow.

As the patient inhales, the helium-oxygen mixture enters the facepiece through an intake check valve, and as he exhales, the expired air passes out through an adjustable exhaust check valve. A positive pressure can be maintained in the facepiece by sliding the weight on the beam to a point over the bellows and turning in the adjusting screw on the exhaust valve of the facepiece, thus increasing the spring tension on the valve. The facepiece is also equipped with an emergency intake check valve with a spring slightly stronger than that in the intake check valve to which the breathing hose is attached. If the helium-oxygen mixture is shut off while the facepiece is in place, the emergency valve acts as the intake but at a slightly increased resistance.

TESTS OF APPARATUS

Oxygen percentages were determined with the Orsat apparatus. It was not considered necessary to analyze for helium because of the known purity of the helium used. Mixtures of from 1 percent to 100 percent oxygen were obtained by adjusting the valve containing the slot orifices. Tests on normal persons with different types of breathing showed that the oxygen never fell more than a slight fraction of a percent below 20 percent when the adjustable valve was set at 20 percent. On the higher settings (above 50 percent oxygen) the oxygen never varied more than 3 percent above or below the setting.

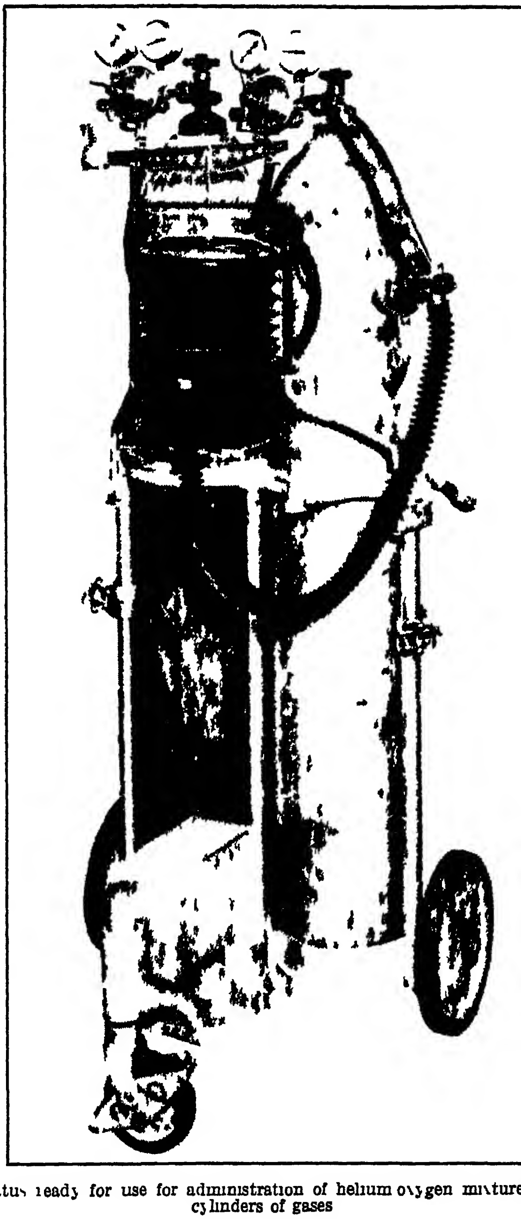

FIGURE 1.—Apparatus ready for use for administration of helium oxygen mixtures utilizing separate cylinders of gases

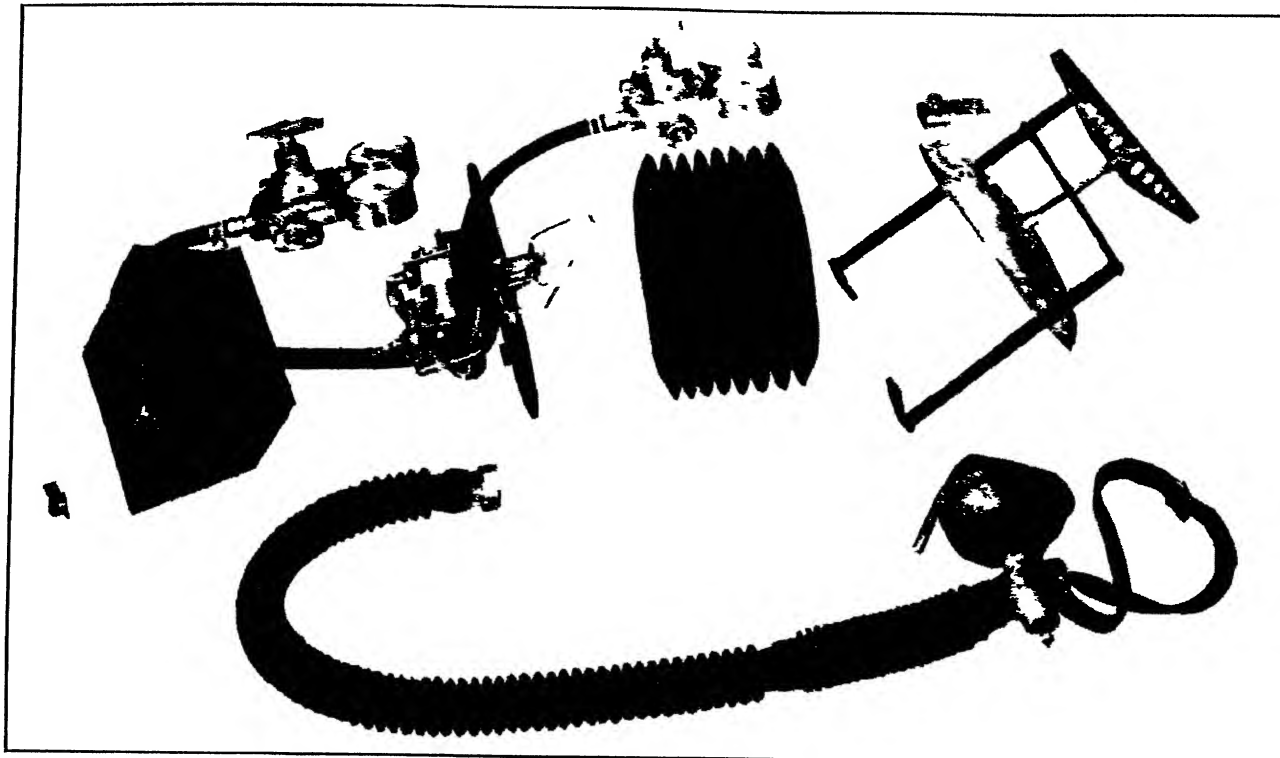

FIGURE 2—Essential parts of new helium oxygen apparatus partially disassembled

Equal flow pressures must be maintained on the tank gages. It was observed that 5 pounds flow pressure provided the volume of the mixture necessary for best operation.

SUMMARY

The importance of helium-oxygen mixtures as a therapeutic aid has gained increasing recognition since 1934. A new apparatus for the administration of helium-oxygen mixtures is described.

Features of the new apparatus presented include:

1. The use of relatively inexpensive separate cylinders of helium and oxygen.

2. Devices which regulate the flow of the two gases in accordance with the patient's needs.

3. A safety valve which prevents the flow of helium until the oxygen has been turned on.

4. An adjustable weight arrangement which makes possible the maintenance of a positive pressure in the facepiece.

5. A device which permits wide selection of the percentages of the gases and which at a setting of 20 percent oxygen prevents the fall of oxygen concentration more than a fraction of 1 percent.

REFERENCES

(*1*) Stewart, A.: About helium. U. S. Bur. Mines, Circ. 6745 (1933).

(*2*) Cady, H. P., and McFarland, D. F.: On the occurrence of helium in natural gas. Proc. Am. Chem. Soc., 1906, Minutes 33d General Meeting, December 29, 1905, to January 2, 1906.

———: The occurrence of helium in natural gas and the composition of natural gas. J. Am. Chem. Soc., **29**: 1523 (1907).

(*3*) McLennan, J. C.: Helium: its production and uses. Nature, **105**: 778 (1920).

(*4*) Sayers, R. R., Yant, W. P., and Hildebrand, J. H.: Possibilities in the use of helium-oxygen mixtures as a mitigation of caisson disease. U. S. Bur. Mines, Repts. Investigations 2670 (1925).

(*5*) Sayers, R. R., and Yant, W. P.: Value of helium-oxygen atmosphere in diving and caisson operations. Anesth. and Analg., **5**: 127 (1926).

(*6*) Behnke, A. R., and Yarbrough, O. D.: Physiologic studies of helium. U. S. Naval Med. Bull., **36**: 542 (1938).

Brown, E. W.: The human machine in deep-sea diving. Proc. U. S. Naval Inst., **63**: 822 (1937).

End, E.: Rapid decompression following inhalation of helium-oxygen mixtures under pressure. Am. J. Physiol., **120**: 712 (1937).

———: Use of new equipment and helium gas in a world record dive. J. Ind. Hyg. Toxicol., **20**: 511 (1938).

Yant, W. P.: Helium in deep diving. Ind. Eng. Chem., News Ed., **5**: (5) 4 (1927).

How helium helps the submarine diver. Chemicals, November 26, 1926.

(*7*) Barach, A. L.: Use of helium as a new therapeutic gas. Proc. Soc. Exp. Biol. and Med., **32**: 462 (1934).

(*8*) Maytum, C. K., Prickman, L. E., and Boothby, W. M.: Use of helium and oxygen in the treatment of severe intractable asthma. Proc. Staff Meet. Mayo Clin., **10**: 788 (1935).

(*9*) Barach, A. L.: Use of helium as a new therapeutic gas. Anesth. and Analg., **14**: 210 (1935).

———: Use of helium in the treatment of asthma and obstructive lesions in the larynx and trachea. Ann. Int. Med., **9**: 739 (1935).

. Effects of inhalation of helium mixed with oxygen on the mechanics of respiration. J. Clin. Invest., **15**: 47 (1936).

Barach, A. L.: Therapeutic use of helium. J. Am. Med. Assoc., 107: 1273 (1936).
Kernan, J. D., and Barach, A. L.: Role of helium in cases of obstructive lesions in the trachea and larynx. Arch. Otolaryng., 26: 419 (1937).
Schwartz, A. L.: Relief of status asthmaticus by helium (case report). J. Med., 19: 122 (1938).
(10) Lovelace, W. R., Jr., Mayo, C. W., and Boothby, W. M.: Aero-otitis media: its alleviation or prevention by the inhalation of helium and oxygen. Proc. Staff Meet. Mayo Clin., 14: 91 (1939).
(11) Behnke, A. R.: Some physiological considerations of inhalation anesthesia and helium. Anesth. and Analg., 19: 35 (1940).

PART IV OF SERIES ON RHEUMATIC HEART DISEASE IN PHILADELPHIA HOSPITALS

In order to allow publication of matter relating to the national defense program, publication of part IV of the series on rheumatic fever in Philadelphia hospitals, by Dr. O. F. Hedley, has been postponed until the next issue of Public Health Reports.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

August 11–September 7, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended September 7, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—An increase of influenza is normally expected at this season of the year, and while the number of cases (1,658) reported for the 4 weeks ended September 7 is not large, it represents an increase of more than 10 percent over the incidence during the corresponding period in 1939 and about a 30 percent increase over the normal seasonal expectancy. States in the South Atlantic and West South Central regions seem to be mostly responsible for the relatively high incidence. Of the 831 cases reported from the South Atlantic region, Virginia reported 244 and South Carolina 484 cases, while Texas reported 392 of the 517 cases that occurred in the West South Central region.

Number of reported cases of eight communicable diseases in the United States during the 4-week period August 11–September 7, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	770	1,446	1,468	1,658	1,492	1,257	3,149	1,857	2,819	93	99	216
New England	13	17	21	4	3	3	349	280	228	2	1	7
Middle Atlantic	60	84	139	31	17	28	954	374	684	15	30	40
East North Central	79	172	184	121	131	131	803	247	545	16	12	29
West North Central	94	90	103	35	14	107	118	166	139	17	5	18
South Atlantic	177	515	493	831	831	367	191	136	235	12	20	41
East South Central	119	248	248	67	119	119	202	118	118	14	8	21
West South Central	133	196	214	450	219	221	165	116	116	11	9	13
Mountain	52	56	51	79	107	62	151	116	116	1	12	11
Pacific	43	68	86	40	51	67	216	304	304	5	2	13
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	2,376	1,648	1,648	2,524	3,148	3,450	36	89	141	1,655	2,141	2,355
New England	25	30	30	106	94	161	0	0	0	38	33	42
Middle Atlantic	105	461	390	455	453	595	0	0	0	148	148	265
East North Central	1,009	484	430	766	1,002	1,024	10	28	28	158	513	452
West North Central	593	209	50	265	343	431	13	27	27	88	144	173
South Atlantic	236	130	111	290	389	329	2	7	1	345	383	451
East South Central	90	25	88	177	320	245	1	1	2	247	311	395
West South Central	96	55	33	126	171	187	2	8	8	537	434	449
Mountain	79	42	14	116	114	138	6	7	24	51	89	107
Pacific	143	212	113	223	253	304	2	11	39	43	86	86

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

Measles.—For measles, also, the incidence during the 4 weeks ended September 7 was relatively high, about 70 percent above last year's figure for this period and more than 10 percent above the 1935–39 median figure. The highest incidence was reported from the North Atlantic and East North Central regions, but all regions except the West North Central and South Atlantic reported increases over the seasonal expectancy.

Poliomyelitis.—The number of cases of poliomyelitis rose from 716 for the preceding 4-week period to 2,376 for the 4 weeks ended September 7. Of the total number of cases, Michigan reported 413; Indiana, 286; Iowa, 234; Kansas, 173; West Virginia, 169; Ohio, 159; Illinois, 88; and Missouri, 79. More than two-thirds of the cases occurred in those eight States. It is apparent that the disease is most prevalent in the North Central regions as all of the States reporting an unusually high incidence, except West Virginia, are located in those regions. While the figures were not high in the West South Central, Mountain, and Pacific regions, they represent some increase over the 1935–39 median figures for this period.

Compared with recent years the current incidence is more than 1.4 times the incidence during this period in 1939, which figure (1,648 cases) also represents the average incidence for the preceding 5 years. An increase of this disease is normally expected at this season of the year, but the increase during the current period was somewhat sharper than might be expected. In recent years the peak incidence for the season has generally been reached during the period corresponding to the current one, but since most of the States reported the highest incidence during the last week of the current period (week ended September 7) further increases may be expected.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria was the lowest on record for this period. The reported cases numbered 770, as compared with 1,446, 1,909, and 1,468 for the corresponding period in 1939, 1938, and 1937, respectively. In the Mountain region the number of cases stood at about the normal seasonal level, but in all other regions the incidence was relatively low.

Meningococcus meningitis.—The number of cases (93) of meningococcus meningitis was only slightly below the number reported for the corresponding period in 1939, but it was only about 43 percent of the 1935–39 median figure for this period. About the average number of cases was reported from the West North Central and West South Central regions, but in all other regions the incidence was considerably below the seasonal expectancy.

Scarlet fever.—The incidence of scarlet fever was also below the average; the reported cases numbered 2,524, as against 3,148 for the same period in 1939 and a median of 3,450 cases for the years 1935–39. Each section of the country shared in the favorable situation of this disease that now exists. During recent months scarlet fever has been unusually prevalent in the Atlantic Coast, East North Central, and East South Central regions, but very significant decreases were reported from those regions during the current period.

Smallpox.—The smallpox incidence was relatively low, 36 cases as compared with 89 cases for the corresponding period in 1939, and 141 cases as a median figure for the years 1935–39. During the last week of the 4-week period under consideration (week ended September 7) there was not a case of smallpox reported.

Typhoid and paratyphoid fever.—The incidence of typhoid and paratyphoid fever remained at a relatively low level. The number of reported cases (1,655) was about 75 percent of the incidence during the corresponding period in 1939 and approximately 70 percent of the 1935–39 median figure for this period. The West South Central region reported about a 20 percent increase in the number of cases

over the estimated expectancy, but in all other regions the situation was quite favorable.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended September 7, based on data received from the Bureau of the Census, was 9.5 per 1,000 inhabitants (annual basis). The rate for this period in 1939 was also 9.5, and the average rate in the years 1935–39 was 9.8.

COURT DECISION ON PUBLIC HEALTH

State health department record of physical examination of person held admissible in evidence.—(Alabama Supreme Court; *Woodmen of the World Life Ins. Soc.* v. *Guyton,* 194 So. 655; decided March 14, 1940.) In a case in which an action had been brought on a life insurance certificate, one of the questions presented to the Supreme Court of Alabama, on appeal by the insurance society, was as to the admissibility in evidence of a certified copy of a record, on file in the State health department, of a physical examination of the deceased, which examination had been made by the said department to ascertain whether or not he had tuberculosis. It appeared that the deceased had been examined, prior to the issuance of the insurance contract and without reference thereto, by someone connected with the State health department. The trial court refused to allow the insurance society to introduce the health department record in evidence.

The supreme court said that it had been unable to find any express statutory authority for the admission in evidence of such a document, but it pointed out that the State legislature had made annual appropriations to be expended by the State board of health for certain purposes, among them being to conduct campaigns for education as to the causation, propagation, and prevention of tuberculosis, hookworm disease, typhoid and malarial fevers, and other preventable diseases, and "to conduct campaigns for the examination of tuberculosis, hookworm diseases, typhoid and malarial fevers, and other preventable diseases, insofar as this may be accomplished," and stated that this duty was enjoined by positive statute upon the State health department. "Necessarily," it was said in the opinion, "the duty enjoined carries with it the duty to make and keep records, and these records are, when properly certified, admissible in evidence." The conclusion was that the trial court had erred in refusing to permit the insurance society to introduce in evidence the certified copy of the record of examination. "This certificate was competent evidence, prima facie of the matters therein contained."

DEATHS DURING WEEK ENDED SEPTEMBER 14, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 14, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,205	7,447
Average for 3 prior years	7,268	
Total deaths, first 37 weeks of year	314,533	308,694
Deaths under 1 year of age	490	462
Average for 3 prior years	495	
Deaths under 1 year of age, first 37 weeks of year	18,534	18,610
Data from industrial insurance companies:		
Policies in force	64,881,635	66,702,292
Number of death claims	11,088	11,008
Death claims per 1,000 policies in force, annual rate	8.9	8.6
Death claims per 1,000 policies, first 37 weeks of year, annual rate	9.8	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 21, 1940

Summary

For the current week, 796 cases of poliomyelitis were reported in the United States, as compared with 797 for the preceding week and with a 5-year (1935–39) median of 484. Last week's median of 501 cases was the peak week of the 5-year medians.

During the current week, increases are shown in 5 geographic areas, decreases in 4. The two North Central groups of States continue to report the highest incidence, with 565 cases, or 71 percent of the total, and with only about 30 percent of the total population. The number of cases in the East North Central States dropped from 361 for the preceding week to 305 for the current period, while the number in the West North Central States increased from 217 to 260. The largest numbers of cases in these States were reported in Iowa (121) and Michigan (115). In the South Atlantic area, the number of cases in West Virginia increased from 48 to 66, and in Virginia from 16 to 22. North Carolina, with 7 cases (10 last week), was the only other State in this group to report any cases. In the Pacific States, increases are recorded for Washington (from 12 to 20) and Oregon (from 4 to 8), while the number of cases in California decreased from 14 to 9.

Of the other 8 communicable diseases included in the weekly table, only influenza and measles were above the 5-year median, the incidence of neither being high. Nine cases of smallpox were reported (4 in Minnesota), 2 cases of Rocky Mountain spotted fever, 6 cases of undulant fever, 10 cases of encephalitis, 1 case of tularaemia (in Utah), and 70 cases of endemic typhus (24 in Georgia and 13 in Alabama).

For the current week, the Bureau of the Census reported 7,669 deaths in 88 major cities of the United States, as compared with 7,205 for the preceding week, and with a 3-year (1937–39) average of 7,592 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended September 21, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 21, 1940	Sept. 23, 1939		Sept. 21, 1940	Sept. 23, 1939		Sept. 21, 1940	Sept. 23, 1939		Sept. 21, 1940	Sept. 23, 1939	
NEW ENG.												
Maine	1	0	1	------	------	------	10	26	9	0	0	0
New Hampshire	0	0	0	------	------	------	0	5	1	0	0	0
Vermont	1	0	0	------	------	------	1	0	3	0	0	0
Massachusetts	3	6	4	------	------	------	39	17	17	2	1	1
Rhode Island	0	0	0	------	------	------	0	13	0	0	0	0
Connecticut	0	1	1	1	------	2	2	3	3	0	0	0
MID. ATL.												
New York	6	8	13	[1] 2	[1] 3	[1] 5	48	35	43	3	2	4
New Jersey	1	1	10	2	3	4	32	9	14	0	0	1
Pennsylvania	11	14	14	------	------	------	92	24	24	8	3	3
E. NO. CEN.												
Ohio	8	9	14	14	2	2	5	5	7	0	0	1
Indiana	15	13	15	18	------	12	11	3	3	1	0	1
Illinois	10	20	28	4	5	7	24	10	15	1	2	2
Michigan [2]	1	6	9	11	2	1	54	18	18	0	1	1
Wisconsin	0	0	4	23	35	28	56	20	27	2	8	1
W. NO. CEN.												
Minnesota	1	4	5	1	1	------	9	13	11	0	0	0
Iowa	2	5	3	------	1	------	34	3	3	1	0	0
Missouri	11	8	14	1	------	18	2	3	6	1	0	0
North Dakota	4	0	1	1	14	4	2	2	2	0	0	0
South Dakota	1	4	1	2	1	------	5	5	1	0	0	0
Nebraska	2	4	8	------	------	------	11	1	1	1	0	0
Kansas	7	3	5	1	------	1	4	3	3	0	3	1
SO. ATL.												
Delaware	0	1	0	------	------	------	2	2	2	0	0	0
Maryland [2]	4	2	7	1	2	3	5	5	5	1	1	1
District of Columbia	1	2	4	------	------	------	0	1	1	0	0	0
Virginia	23	35	35	58	37	------	6	10	6	3	0	1
West Virginia [2]	9	10	16	6	2	13	1	2	5	0	1	2
North Carolina [3]	46	103	103	------	------	------	12	7	15	0	0	0
South Carolina [4]	7	36	27	97	157	157	1	0	2	1	0	0
Georgia [4]	9	41	34	4	8	------	3	0	0	0	0	0
Florida [4]	8	9	10	------	3	1	2	1	1	0	0	0
E. SO. CEN.												
Kentucky	9	19	25	2	------	2	4	4	12	0	2	2
Tennessee	8	23	43	9	17	17	11	4	4	2	2	2
Alabama [4]	10	50	50	198	20	13	5	1	1	0	0	2
Mississippi [2] [4]	13	15	19	------	------	------	------	------	------	1	0	0
W. SO. CEN.												
Arkansas	10	15	15	10	3	8	18	2	2	0	0	0
Louisiana [4]	8	17	16	2	3	3	0	1	1	0	0	0
Oklahoma [2]	10	8	10	21	5	16	4	1	1	1	0	0
Texas [4]	29	32	83	102	70	54	17	8	8	1	0	0
MOUNTAIN												
Montana	0	1	1	4	------	4	27	5	5	1	0	0
Idaho	0	0	0	------	------	------	5	2	2	0	0	0
Wyoming	5	0	0	------	------	------	2	9	4	0	0	0
Colorado	1	11	7	6	8	------	6	5	5	0	1	0
New Mexico	8	1	2	------	------	------	1	0	4	0	0	0
Arizona	0	1	2	30	33	10	12	0	1	0	0	0
Utah [2]	1	0	0	3	------	------	2	1	2	0	0	0
PACIFIC												
Washington	2	2	1	------	------	------	2	66	10	2	0	0
Oregon	10	4	1	9	6	6	6	20	7	0	0	0
California	18	9	30	11	10	11	31	54	54	1	0	1
Total	334	553	759	654	451	471	626	429	519	29	22	49
38 weeks	10,041	14,199	17,174	171,545	153,627	142,829	231,800	350,598	350,598	1,247	1,501	4,446

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 21, 1940, and comparison with corresponding week of 1939 and 5-year median— Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–40	Week ended		Median, 1935–40	Week ended		Median, 1935–40	Week ended		Median, 1935–39
	Sept. 21, 1940	Sept. 23, 1939		Sept. 21, 1940	Sept. 23, 1939		Sept. 21, 1940	Sept. 23, 1939		Sept. 21, 1940	Sept. 23, 1939	
NEW ENG.												
Maine	0	0	1	2	2	3	0	0	0	0	3	1
New Hampshire	0	1	1	3	1	1	0	0	0	3	1	0
Vermont	2	3	3	4	0	2	0	0	0	0	2	0
Massachusetts	1	6	6	35	31	43	0	0	0	2	1	1
Rhode Island	0	0	0	1	0	5	0	0	0	1	0	0
Connecticut	0	4	4	8	11	12	0	0	0	1	4	4
MID. ATL.												
New York	18	128	61	102	57	86	0	0	0	22	15	20
New Jersey	5	38	21	26	33	23	0	0	0	2	12	11
Pennsylvania	11	50	12	87	106	106	0	0	0	20	17	22
E. NO. CEN.												
Ohio	52	12	12	79	80	111	0	9	0	18	14	27
Indiana	49	3	3	35	27	37	0	1	1	8	8	8
Illinois	62	13	13	127	93	109	1	1	1	16	70	26
Michigan [2]	115	53	45	100	84	84	0	0	1	8	11	12
Wisconsin	27	6	6	38	60	63	0	0	0	1	2	3
W. NO. CEN.												
Minnesota	16	52	6	32	34	34	4	0	1	5	4	4
Iowa	121	5	4	34	28	28	0	4	2	2	2	4
Missouri	32	1	3	27	13	44	0	0	0	13	13	21
North Dakota	5	0	1	6	6	6	1	1	1	0	0	2
South Dakota	9	0	0	8	11	6	0	1	1	0	0	0
Nebraska	24	0	0	12	16	6	0	0	0	3	0	1
Kansas	53	3	3	35	34	47	0	0	0	11	6	7
SO. ATL.												
Delaware	0	0	0	4	6	1	0	0	0	4	1	1
Maryland [2]	0	2	5	16	27	19	0	0	0	6	3	13
Dist. of Col.	0	2	2	3	5	7	0	0	0	4	0	0
Virginia	22	2	4	11	20	20	0	0	0	11	12	24
West Virginia [2]	66	2	2	17	34	46	0	0	0	11	12	20
North Carolina [3]	7	3	1	64	63	58	0	1	0	15	7	18
South Carolina [4]	0	8	0	2	19	9	0	1	0	14	11	14
Georgia [4]	0	2	1	19	23	22	0	0	0	18	15	15
Florida [4]	0	2	1	3	3	4	0	0	0	4	1	4
E. SO. CEN.												
Kentucky	16	7	5	19	33	58	1	0	0	18	28	28
Tennessee	3	0	1	52	43	36	0	0	0	25	16	21
Alabama [4]	1	1	1	32	26	18	0	0	0	20	6	13
Mississippi [2] [4]	3	1	1	10	11	11	0	0	0	9	4	4
W. SO. CEN.												
Arkansas	0	1	1	6	9	9	0	0	0	14	21	15
Louisiana [4]	8	0	2	4	6	7	0	0	0	23	17	17
Oklahoma [3]	8	2	1	9	4	8	0	3	0	11	20	20
Texas [4]	1	7	5	19	14	23	1	0	0	46	43	45
MOUNTAIN												
Montana	5	1	1	17	13	13	0	2	5	0	3	2
Idaho	6	0	1	8	3	8	0	0	0	8	2	1
Wyoming	5	1	1	2	1	1	1	0	0	1	0	0
Colorado	3	6	6	11	16	13	0	5	2	7	7	7
New Mexico	1	14	1	1	11	2	0	0	0	5	4	15
Arizona	0	2	2	2	1	4	0	0	0	2	2	2
Utah [2]	2	3	0	0	4	4	0	0	0	0	1	1
PACIFIC												
Washington	20	1	1	15	8	13	0	0	2	1	15	6
Oregon	8	3	2	5	6	10	0	0	0	1	7	4
California	9	33	27	66	80	80	0	2	2	8	8	18
Total	796	484	484	1,218	1,216	1,387	9	31	42	422	451	578
38 weeks	5,652	4,439	4,439	122,906	121,178	170,459	2,011	8,794	8,233	7,058	9,662	10,885

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 21, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough, week ended—		Division and State	Whooping cough, week ended—	
	Sept. 21, 1940	Sept. 23, 1939		Sept. 21, 1940	Sept. 23, 1939
NEW ENG.			SO. ATL.—continued		
Maine	12	21	South Carolina [4]	12	24
New Hampshire	0	8	Georgia [4]	10	6
Vermont	0	28	Florida [4]	2	5
Massachusetts	150	91	E. SO. CEN.		
Rhode Island	4	6	Kentucky	58	63
Connecticut	47	64	Tennessee	16	24
MID. ATL.			Alabama [4]	7	14
New York	237	324	Mississippi [2, 4]	---------	---------
New Jersey	90	108	W. SO. CEN.		
Pennsylvania	330	310	Arkansas	21	9
E. NO. CEN.			Louisiana [4]	5	16
Ohio	243	121	Oklahoma [3]	3	8
Indiana	25	45	Texas [4]	144	53
Illinois	116	214	MOUNTAIN		
Michigan [2]	329	151	Montana	7	4
Wisconsin	82	117	Idaho	6	2
W. NO. CEN.			Wyoming	7	24
Minnesota	87	72	Colorado	6	20
Iowa	42	19	New Mexico	22	18
Missouri	34	25	Arizona	8	19
North Dakota	3	8	Utah [2]	36	25
South Dakota	2	9	PACIFIC		
Nebraska	8	4	Washington	34	15
Kansas	39	12	Oregon	6	0
SO. ATL.			California	257	113
Delaware	8	19	Total	2,722	2,387
Maryland [2]	80	44	38 weeks	120,292	139,425
Dist. of Col.	7	30			
Virginia	34	26			
West Virginia [1]	36	7			
North Carolina [3]	60	47			

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended September 21, 1940, 2 cases as follows: North Carolina, 1; Oklahoma, 1.
[4] Typhus fever, week ended September 21, 1940, 70 cases as follows: South Carolina, 4; Georgia, 24; Florida, 3; Alabama, 13; Mississippi, 1; Louisiana, 6; Texas, 19.

WEEKLY REPORTS FROM CITIES

City reports for week ended September 7, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	94	35	11	137	278	279	2	326	77	1,110	--------
Current week	42	32	11	168	206	180	0	318	49	841	--------
Maine:											
Portland	0	------	0	0	0	0	0	0	0	9	16
New Hampshire:											
Concord	0	------	0	0	0	0	0	1	0	0	10
Manchester	0	------	0	0	1	0	0	0	0	0	21
Nashua	0	------	0	0	0	0	0	0	0	0	6
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	--------
Burlington	0	------	0	0	0	0	0	0	0	0	8
Rutland	0	------	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	0	------	0	12	6	4	0	6	2	41	188
Fall River	0.	------	0	2	0	0	0	0	0	1	29
Springfield	0	------	0	0	0	0	0	1	0	0	37
Worcester	0.	------	0	16	6	0	0	0	0	1	41
Rhode Island:											
Pawtucket	0.	------	0	0	0	0	0	0	0	0	12
Providence	0	------	0	0	2	1	0	1	3	0	56
Connecticut:											
Bridgeport	0	------	0	0	0	1	0	0	0	4	31
Hartford	0	------	0	0	2	0	0	1	1	1	36
New Haven	0	1	0	0	0	2	0	0	0	8	23
New York:											
Buffalo	0	------	0	0	2	4	0	7	0	8	111
New York	6	8	1	41	53	27	0	63	6	97	1,325
Rochester	0.	------	0	1	6	1	0	2	0	15	71
Syracuse	0	------	0	0	1	1	0	1	0	5	46
New Jersey:											
Camden	0	------	0	4	0	2	0	0	0	2	24
Newark	0	------	0	8	0	4	0	5	0	10	93
Trenton	0	------	0	0	0	1	0	3	1	5	28
Pennsylvania:											
Philadelphia	1	3	3	11	11	13	0	21	4	44	423
Pittsburgh	1	1	2	1	5	2	0	4	5	29	146
Reading	0	------	0	2	2	0	0	2	0	10	22
Scranton	0	------	--------	0	-------	0	0	-------	0	0	--------
Ohio:											
Cincinnati	0	------	0	0	0	0	0	5	0	23	109
Cleveland	0	3	0	0	1	4	0	9	0	65	144
Columbus	0	------	0	1	2	0	0	1	0	15	73
Toledo	0	1	1	2	0	0	0	5	3	8	47
Indiana:											
Fort Wayne	0	------	0	0	2	1	0	0	1	0	20
Indianapolis	0	------	0	3	2	2	0	2	0	4	80
Muncie	0	------	0	0	0	1	0	1	0	1	9
South Bend	0	------	0	0	0	0	0	0	0	0	11
Terre Haute	0	------	0	0	1	0	0	0	1	0	17
Illinois:											
Alton	0	1	1	0	3	0	0	0	1	0	10
Chicago	5	3	0	7	17	35	0	43	1	77	587
Elgin	0	------	0	0	0	0	0	0	0	7	9
Moline	0	------	0	0	0	1	0	0	0	0	9
Springfield	0	------	0	0	0	0	0	0	0	0	13
Michigan:											
Detroit	0	------	0	16	5	12	0	18	3	104	209
Flint	0	------	0	0	3	0	0	0	0	3	24
Grand Rapids	0	------	0	0	0	0	0	0	1	41	26
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	0	9
Madison	0	------	0	1	0	1	0	0	0	0	11
Milwaukee	0	------	0	10	0	5	0	2	0	0	82
Racine	0	------	0	3	0	1	0	0	0	3	10
Superior	0	------	0	1	0	0	0	0	0	3	5

City reports for week ended September 7, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0	------	0	0	0	0	0	0	0	0	36
Minneapolis	5	------	0	2	2	6	0	2	0	6	89
St. Paul	0	------	0	1	0	2	0	3	0	5	67
Iowa:											
Cedar Rapids	0	------	------	0	------	1	0	------	0	0	------
Davenport	0	------	------	0	------	0	0	------	0	0	------
Des Moines	3	------	0	0	0	1	0	0	0	0	34
Sioux City	0	------	------	0	------	1	0	------	0	0	------
Waterloo	0	------	------	0	------	1	0	------	0	1	------
Missouri:											
Kansas City	0	------	0	1	5	1	0	5	1	4	8[illegible]
St. Joseph	0	------	0	0	0	1	0	0	0	2	28
St. Louis	4	1	0	0	7	1	0	7	1	8	201
North Dakota:											
Fargo	0	------	0	0	0	1	0	0	0	3	7
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	6
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	1	------
Sioux Falls	0	------	0	0	0	0	0	0	0	0	9
Nebraska:											
Lincoln	0	------	------	0	------	1	0	------	0	2	------
Omaha	0	------	0	1	1	0	0	1	0	0	51
Kansas:											
Lawrence	0	------	0	0	1	0	0	0	0	0	5
Topeka	0	------	0	0	2	2	0	2	0	0	23
Wichita	0	------	0	1	1	1	0	0	0	2	12
Delaware:											
Wilmington	0	------	0	0	0	0	0	1	0	4	26
Maryland:											
Baltimore	1	1	1	2	5	3	0	7	0	39	106
Cumberland	0	------	0	0	0	0	0	2	0	0	11
Frederick	0	------	0	0	0	0	0	0	0	0	1
District of Columbia:											
Washington	3	------	0	1	6	2	0	10	0	3	141
Virginia:											
Lynchburg	0	------	0	0	1	0	0	0	0	0	7
Norfolk	0	------	0	0	3	0	0	4	0	0	55
Richmond	0	------	1	0	1	0	0	0	1	0	39
Roanoke	0	------	0	0	0	1	0	0	0	4	16
West Virginia:											
Charleston	0	------	0	0	0	0	0	0	0	0	12
Huntington	0	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	0	0	0	0	0	0	0	2	------
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	1	------
Raleigh	0	------	0	0	0	0	0	1	0	3	7
Wilmington	0	------	0	0	0	0	0	0	0	0	7
Winston-Salem	3	------	0	0	0	3	0	1	0	7	18
South Carolina:											
Charleston	1	2	0	4	1	0	0	0	1	0	12
Florence	0	------	0	0	1	0	0	0	0	0	7
Greenville	0	------	0	0	0	0	0	0	0	0	3
Georgia:											
Atlanta	1	2	0	0	3	1	0	7	1	1	63
Brunswick	0	------	0	0	0	0	0	0	0	0	3
Savannah	0	2	1	0	0	0	0	1	0	0	28
Florida:											
Miami	0	1	0	0	0	0	0	1	2	0	25
Tampa	0	2	0	0	1	1	0	0	0	0	19
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	0	0	7
Covington	0	------	0	0	1	1	0	1	0	0	15
Lexington	0	------	0	1	1	0	0	1	1	3	12
Louisville	0	------	0	0	0	2	0	0	0	8	28
Tennessee:											
Knoxville	0	------	0	0	0	0	0	1	1	0	27
Memphis	0	------	0	0	1	1	0	2	0	3	70
Nashville	0	------	0	1	2	0	0	1	1	4	43
Alabama:											
Birmingham	0	2	0	0	1	4	0	3	0	0	52
Mobile	0	------	1	0	2	1	0	0	0	0	12
Montgomery	1	------	------	0	------	0	0	------	0	4	------

City reports for week ended September 7, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	0	------	0	0	1	0	0	3	0	0	------
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	1	0	2
New Orleans	1	------	1	1	3	0	0	8	7	3	118
Shreveport	1	------	0	0	0	1	0	2	1	0	42
Oklahoma:											
Oklahoma City	1	------	0	0	3	2	0	2	0	0	31
Tulsa	0	------	0	0	0	0	0	0	0	0	13
Texas:											
Dallas	0	------	0	0	1	1	0	2	2	4	68
Fort Worth	0	------	0	0	0	0	0	1	0	3	21
Galveston	0	------	0	0	2	0	0	1	0	0	13
Houston	1	------	0	5	4	0	0	6	1	2	82
San Antonio	0	------	0	0	3	1	0	7	1	1	68
Montana:											
Billings	0	------	0	0	2	0	0	0	0	0	6
Great Falls	0	------	0	0	1	0	0	0	0	0	7
Helena	0	------	0	0	0	1	0	0	0	0	1
Missoula	0	------	0	0	0	0	0	0	0	0	6
Idaho:											
Boise	0	------	0	0	0	1	0	0	0	0	7
Colorado:											
Colorado Springs	0	------	0	0	0	0	0	2	0	0	19
Denver	3	------	0	2	4	5	0	2	0	6	81
Pueblo	0	------	0	0	1	0	0	1	0	0	10
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	1	0	0	12
Utah:											
Salt Lake City	0	------	0	1	0	2	0	0	0	18	27
Washington:											
Seattle	1	------	0	0	6	0	0	6	0	12	99
Spokane	0	------	0	0	0	0	0	0	1	0	26
Tacoma	0	------	0	0	3	0	0	0	0	1	20
Oregon:											
Portland	1	------	0	0	1	2	0	2	0	0	67
Salem	0	------	------	0	------	0	0	------	0	4	------
California:											
Los Angeles	3	1	0	5	2	8	0	16	1	44	252
Sacramento	1	------	0	1	0	3	0	2	0	1	17
San Francisco	0	------	0	0	2	2	0	8	0	21	109

City reports for week ended September 7, 1940—Continued

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Springfield	0	0	1
Worcester	0	0	2
Rhode Island:			
Providence	0	0	1
New York:			
New York	2	0	4
Rochester	0	0	1
Pennsylvania:			
Philadelphia	0	0	3
Scranton	0	0	1
Ohio:			
Cincinnati	0	0	5
Cleveland	0	0	3
Columbus	0	0	4
Toledo	0	0	1
Indiana:			
Fort Wayne	0	0	1
Indianapolis	0	0	4
Muncie	0	0	3
South Bend	0	0	2
Illinois:			
Chicago	0	0	13
Moline	0	0	1
Michigan:			
Detroit	0	0	12
Grand Rapids	0	0	15
Wisconsin:			
Madison	0	0	2
Milwaukee	0	0	1
Minnesota:			
Duluth	0	0	1
Minneapolis	0	0	1
St. Paul	0	0	1
Iowa:			
Cedar Rapids	0	0	2
Davenport	0	0	1
Des Moines	0	0	4
Sioux City	0	0	2
Waterloo	0	0	4
Missouri:			
Kansas City	0	0	4
St. Joseph	0	0	3
North Dakota:			
Fargo	0	0	1
South Dakota:			
Sioux Falls	0	0	4
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	4
Kansas:			
Topeka	0	0	3
Wichita	0	0	5
Virginia:			
Richmond	0	0	1
West Virginia:			
Charleston	0	0	2
Huntington	0	0	2
Wheeling	2	0	0
Kentucky:			
Ashland	0	0	2
Louisville	0	0	1
Alabama:			
Mobile	0	0	1
Oklahoma:			
Tulsa	0	0	1
Texas:			
Dallas	0	0	1
Houston	0	0	2
Montana:			
Helena	0	0	2
Idaho:			
Boise	0	0	1
Colorado:			
Denver	0	0	1
Pueblo	0	0	1
Washington:			
Seattle	0	0	5
Spokane	0	0	1
Tacoma	0	0	2
California:			
Los Angeles	0	0	11
Sacramento	0	0	2

Encephalitis, epidemic or lethargic.—Cases: Rochester, 1; Toledo, 1; Great Falls, 3; Helena, 1; Seattle, 1; Sacramento, 3; San Francisco, 1.

Pellagra.—Cases: Philadelphia, 1; Chicago, 1; Charleston, S. C., 1; Mobile, 1; Los Angeles, 1.

Typhus fever.—Cases: Charleston, S. C., 1; Atlanta, 2; Savannah, 2; Miami, 1; Mobile, 4; Lake Charles, 1; Dallas, 1; Fort Worth, 1; Houston, 4. Deaths: Houston, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 10, 1940.—During the week ended August 10, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1						1
Chickenpox			1	27	102	18	5	4	14	171
Diphtheria		1	1	23		2				27
Dysentery				1	4					5
Influenza		1			34	1			28	64
Lethargic encephalitis							1			1
Measles	2		2	109	68	40	47	10	11	289
Mumps				5	28	6	8		2	49
Pneumonia					7	2				9
Poliomyelitis					2					2
Scarlet fever		3		41	29	5		6	10	94
Tuberculosis	1	18	16	90	66	9	15	1		216
Typhoid and paratyphoid fever			1	22	4	1	1		1	30
Whooping cough		3		105	71	36	9	11	29	264

FINLAND

Communicable diseases—4 weeks ended May 18, 1940.—During the 4 weeks ended May 18, 1940, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	213	Poliomyelitis	21
Dysentery	27	Scarlet fever	1,135
Influenza	3,433	Typhoid fever	22
Paratyphoid fever	94	Undulant fever	1

YUGOSLAVIA

Notifiable diseases—4 weeks ended July 14, 1940.—During the 4 weeks ended July 14, 1940, certain notifiable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	31	4	Poliomyelitis	2	
Cerebrospinal meningitis	232	37	Scarlet fever	148	1
Diphtheria and croup	363	20	Sepsis	4	
Dysentery	18	1	Smallpox	1	1
Erysipelas	118	16	Tetanus	62	23
Favus	5	2	Typhoid fever	204	17
Paratyphoid fever	15	2	Typhus fever	27	3

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-June 1940	July 1940	August 1940—week ended—				
				3	10	17	24	31
ASIA								
China:								
Foochow	C							[1] 29
Hong Kong	C						2	3
Macao	C							20
Shanghai	C	5	87	42	52	54	40	61
India	C	21,896						
Bassein	C	164						
Bombay	C			2			3	
Calcutta	C	1,326	147	25	39	19	23	26
Cawnpore	C	13	6	18	39		68	50
Chittagong	C	4						
Madras	C	1						
Moulmein	C	16						
Porto Novo	C	1						
Rangoon	C	37	6					
Vizagapatam	C		16	3	1			
India (French)	C	34						
Indochina (French)	C	436						
Thailand	C	235						

[1] For the month of August 1940.

PLAGUE

[C indicates cases; D, deaths]

AFRICA								
Algeria	C				1		1	4
Plague-infected rats					1		1	
Belgian Congo	C	13						
British East Africa:								
Kenya	C	7						
Uganda	C	103						
Egypt	C	[1] 408	1					
Madagascar	C	472						
Morocco.[2]								
Rhodesia, Northern	C	1						
Senegal:								
Dakar	D	[3] 1						
Thies	C	1						
Tivaouane	C	3						
Union of South Africa	C	25						
ASIA								
China.[4]								
Dutch East Indies: Java and Madura	C	216						
India	C	12,812						
Bassein	C	18						
Cochin	C	1						
Plague-infected rats		3						
Rangoon	C	5						
Indochina (French)	C	3						
Thailand:								
Bangkok	C	3						
Bisnulok Province	C	3						
Chingmai	C				1		1	1

[1] Includes 5 cases of pneumonic plague.
[2] A report dated May 11, 1940, stated that there was an epidemic of bubonic plague in southern Morocco, where several hundred cases had been unofficially reported.
[3] Imported.
[4] Information dated July 7 states that up to July 6, 17 cases of plague had been reported near Tungliao, Hsingan Province, China; and a report dated July 13 states that an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths]

Place		January-June 1940	July 1940	August 1940—week ended—				
				3	10	17	24	31
ASIA—continued								
Thailand—Continued.								
Dhonpuri Province	C	1						
Jayanad Province	C	3						
Kamphaeng Bajr Province	C	29						
Kanchanapuri Province	C	12						
Koan Kaen Province	C	5						
Nagara Svarga Province	C	30						
Noangkhay Province	C	4						
Sukhodaya Province	C	22						
EUROPE								
Portugal: Azores Islands	C	2						
NORTH AMERICA								
United States. (See issues of Sept. 6, p. 1638, and Sept. 20, p. 1749)								
SOUTH AMERICA								
Argentina:								
Cordoba Province	C	[5] 21						
Jujuy Province	C	1	8					
Salta Province	C	2	6					
Santiago del Estero Province	C	24	30					
Tucuman Province	C	5	13					
Brazil:								
Alagoas State	C	5						
Pernambuco State	C	1						
Peru:								
Cajabamba Department	C	1						
Cajamarca Department	C	25	2					
Lambayeque Department	C	10	2					
Libertad Department	C	45	1					
Lima Department	C	32	12					
Piura Department	C	6						
Tumbes Department	C	15	[6] 3					
OCEANIA								
Hawaii Territory: Plague-infected rats		19	10	2	2	1	2	

[5] Includes 11 cases of pneumonic plague.
[6] Suspected.

SMALLPOX

[C indicates cases; D, deaths]

AFRICA								
Algeria	C	5						
Angola	C	35						
Belgian Congo	C	1,709						
British East Africa	C	12						
Dahomey	C	17						
French Guinea	C	13						
Gibraltar	C	[1] 1						
Ivory Coast	C	113						
Nigeria	C	1,815						
Niger Territory	C	594						
Nyasaland	C	56						
Portuguese East Africa	C	1						
Rhodesia, Southern	C	183						
Senegal	C	131						
Sierra Leone	C	10						
Sudan (Anglo-Egyptian)	C	410	31	5	33	3	11	8
Sudan (French)	C	1						
Union of South Africa	C	84						

[1] Imported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths]

Place		January–June 1940	July 1940	August 1940—week ended—				
				3	10	17	24	31
ASIA								
Arabia	C	255						
China	C	784	14		1			
Chosen	C	533						
Dutch East Indies—Sabang	C	4						
India	C	117,874						
India (French)	C	5						
India (Portuguese)	C	20						
Indochina (French)	C	843						
Iran	C	151						
Iraq	C	163	5	1			26	
Japan	C	499	1					
Straits Settlements	C	1						
Sumatra	C	1						
Thailand	C	27	77	11	32	7	5	3
EUROPE								
Great Britain	C	2						
Greece	C	23						
Portugal	C	98	18		3	1		
Spain	C	462	62					
Turkey	C	130						
NORTH AMERICA								
Guatemala	C	17	4					
Mexico	C	52						
SOUTH AMERICA								
Bolivia	C	189						
Brazil	C	1						
Colombia	C	1,038	2	1				
Ecuador	C	1						
Peru	C	6						
Venezuela (alastrim)	C	134	16					

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January–June 1940	July 1940	August 3	August 10	August 17	August 24	August 31
AFRICA								
Algeria	C	1,652	43		29	24		
Belgian Congo	C	1,210						
British East Africa	C	2						
Egypt	C	3,379	112	22	14	17	18	
Eritrea	C	40						
Morocco	C	277						
Tunisia	C	515						
Union of South Africa	C	107	1					
ASIA								
China	C	1,797	210					
Chosen	C	156						
India	C	3						
Indochina (French)	C	2						
Iran	C	233						
Iraq	C	108	8	1	3	2	1	
Japan	C	2						
Palestine	C	53	17	13	5	12	9	
Straits Settlements	C	5						
Trans-Jordan	C	15						
EUROPE								
Bulgaria	C	134		4		1		
Germany	C	129	44	24				
Greece	C	25			1			
Hungary	C	74	1				1	
Irish Free State	C	6	3					
Lithuania	C	115						
Rumania	C	1,213	19		2	3	4	2
Spain	C	14						
Turkey	C	503						
Yugoslavia	C	242	14					

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths]

Place		January–June 1940	July 1940	August 1940—week ended—				
				3	10	17	24	31
NORTH AMERICA								
Guatemala	C	227	28					
Mexico	C	169	1			1	1	1
Panama Canal Zone	C	3						
SOUTH AMERICA								
Bolivia	C	499						
Chile	C	233						
Ecuador	C	2						
Peru	C	197						
Venezuela	C	8						
OCEANIA								
Australia	C	15						
Hawaii Territory	C	16	1	2				

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–June 1940	July 1940	August 1940—week ended—				
				3	10	17	24	31
AFRICA								
Cameroon: Nkongsamba	C	[1] 1						
French Equatorial Africa: Fort Archambault	C	[1] 1						
Gold Coast	C	1						
Ivory Coast	C	1			[1] 2			
Nigeria:								
Ibadan	C	1						
Oshogbo	C	[1] 1						
Togo (French)	C	1						
SOUTH AMERICA								
Brazil:								
Espirito Santo State	D	[2] 28						
Rio de Janeiro State	D	[2] 1						
Colombia:								
Antioquia Department—San Luis	D	2						
Caldas Department—								
La Pradera	D	1						
Samana	D	1						
Victoria	D	1						
Meta Department	D			1				
Santander Department	D		1					

[1] Suspected.
[2] Jungle type.

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

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CONTENTS

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A BRIEF REVIEW OF NEEDED RESEARCH IN MALARIA

At the initiation of the Surgeon General of the United States Public Health Service a group of malariologists met in conference at Atlanta, Ga., May 29 and 30, 1940, for the purpose of considering some of the fundamental aspects of malaria research and of exploring opportunities for stimulating its extension and coordination.[1] The text of the report prepared by the conference follows:

Present methods of malaria control, whatever their character, have discernible limitations either in effectiveness or economic practicability. The first of these limitations has operated to retard the control of malaria all over the world; the effect of the second has been most obvious in the poorer countries of the Tropics. Yet, in the continental United States, the inadequacy of our application of available methods cannot be attributable to economic reasons, but rather to inertia of health departments, and a lack of appreciation of the opportunities for their systematic extension. Notwithstanding, newer and cheaper methods of control will be welcome.

While the discoveries of Laveran and Ross clarified many of the epidemiological characteristics of malaria and gave a scientific basis to what were previously empirical methods of control, it must be confessed that as yet they have not resulted in any fundamentally new approaches to the problem. The accomplishments of subsequent

[1] The group which assembled at Emory University, Atlanta, Ga., included. Dr. E. L. Bishop, director of health, Tennessee Valley Authority, Chattanooga, Tenn.; Dr. J. A. Ferrell, associate director, International Health Division, The Rockefeller Foundation, New York City; Dr. F. C. Bishopp, principal entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.; Dr. M. H. Soule, Department of Bacteriology, University of Michigan, Ann Arbor, Mich.; Dr. E. C. Faust, professor of parasitology, Department of Tropical Medicine, Tulane University, New Orleans, La.; Dr. H. E. Meleney, Department of Preventive Medicine and Public Health, Vanderbilt University, Nashville, Tenn.; Dr. F. L. Roberts, professor of preventive medicine, College of Medicine, University of Tennessee, Memphis, Tenn.; Dr. Glenville Giddings, internist, Emory University, Atlanta, Ga.; Dr. M. F. Boyd, International Health Division, The Rockefeller Foundation, director, Station for Malaria Research, Tallahassee, Fla.; Dr. L. T. Coggeshall, International Health Division, The Rockefeller Institute, New York City; Dr. Justin Andrews, director, Division of Malaria and Hookworm Service, Georgia Department of Public Health, Atlanta, Ga.; Dr. W. V. King, senior entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Orlando, Fla.; Dr. R. B. Watson, chief, Laboratory Service, Tennessee Valley Authority, Wilson Dam, Ala.; Dr. E. H. Hinman, senior biologist, Tennessee Valley Authority, Wilson Dam, Ala.; Dr. T. P. Nash, Jr., dean of School of Biological Sciences, University of Tennessee, Memphis, Tenn.; Dr. Thomas Parran, Surgeon General, U. S. Public Health Service, Washington, D. C.; Dr. L. R. Thompson, director, National Institute of Health, Bethesda, Md.; Dr. Lyndon Small, head chemist, National Institute of Health, Washington, D. C.; Dr. L. L. Williams, Jr., Malaria Investigations, National Institute of Health, Bethesda, Md.

research have largely effected refinements of detail or improvements in techniques, without the discovery of new methods of approach. Furthermore, it hardly seems likely that new methods of approach will be developed until new and hitherto unknown viewpoints are acquired. Consequently there is great need to intensify research on the fundamental aspects of malaria.

It is hoped that nothing in this frank exposition of the deficiencies of our knowledge of malaria will lead to the opinion that the application of measures based on present knowledge is ineffective or undesirable, or in any manner discourage health authorities from continuing rigorously to promote and extend their application.

At the present time it would seem relatively futile to attempt a new program of mosquito control without first having more fundamental knowledge concerning the basic conditions under which the anopheline host lives. Nevertheless, it is desirable to point out the compelling necessity for increasing knowledge of the prophylaxis and treatment of malaria, as well as the control of anopheline production.

I. CHEMOTHERAPY

In view of the great economic disturbances in a large part of the world and consequent difficulties in the international exchange of antimalarial drugs, and the further fact that available antimalarial drugs are effective only against trophozoites, it is apparent that one of the most pressing problems lies in the field of chemotherapy. The possible utilization of existing synthetic compounds in the therapy of malaria, as well as the preparation of new ones, should be studied.

The directed synthesis of new compounds probably is the shortest route to the desired objective, but it must be recognized that preparation of a large number of drugs will be involved and that the synthesis of many of these will be very complicated and tedious. There exists, however, in the numerous institutional and industrial research laboratories in this country a vast collection of organic compounds, many of which are of types that might be effective against some stage of the plasmodium. These samples should be systematically assembled and tested.

The chemotherapeutic approach should not be directed solely towards the discovery of drugs with an action similar to that of quinine or atabrine, which are effective only against trophozoites, but also toward the development of a therapeutic agent which will reach the parasite in its reservoir outside of the red blood cell and thus serve as a true causal prophylactic. A "hit or miss" approach comprising the random testing of various compounds is undesirable since an orderly program developed from definite leads is indicated as, for instance, in the action of plasmochin. This drug in conjunc-

tion with quinine reduces the tendency to relapse following a primary attack of malaria, which suggests that it affects the plasmodium in its exo-erythrocytic stage.

Although many reported (and probably many more unpublished) variations in the chemical arrangement of the plasmochin molecule have been ineffective, the great diversity of possible structural mutations still leaves numerous modifications that have not been tried. As in many other fields, in antimalarials there appears to be an extraordinary specificity in the relation of chemical structure to physiological action. It is quite possible that a relatively minor change in the nature or position of the peripheral groups or of the nuclear structure of plasmochin might result in an important change in the action on the parasite.

It may be assumed that if a drug can be developed that will destroy the sporozoites, either at the time of infection or during their stay in the fixed tissue cells, such drug may (1) serve as a prophylactic, or (2) prevent relapses from an infection that has been temporarily suppressed by quinine or atabrine. The second qualification probably would be much easier to satisfy than the first, since the parasite reservoir might be destroyed easily by a short intensive treatment with the drug. Just as the sporozoites may be presumed to concentrate in certain fixed tissues during an incubation period, or between relapses, a drug designed to destroy them may also concentrate in these tissues, or may flood the whole system for a short time without undue toxic effects. On the other hand, a continuous and prolonged prophylaxis will demand a drug that can be administered through long periods of time without toxic effects or side actions that might be cumulative. Obviously, it will be difficult to develop a drug that will be effective and at the same time so harmless that an adequate concentration could be maintained in the blood throughout any period of exposure.

Most of the compounds that have been found to possess any significant activity in malaria resemble quinine superficially in chemical structure. Quinine does not affect the sporozoites and therefore it seems advisable to examine many widely differing nuclear systems without imitating too closely the quinine structure. This will mean a new and fundamental attack on the parasite and the testing of a large number of widely different types until a suggestive lead is found that will be worth concentrating upon for the most effective modification. As an example showing that the prospects of success in such a search are not too unfavorable, the fact may be cited that sulfanilamide, which does not remotely resemble quinine or the other antimalarials, seems to be effective in monkey malaria. In spite of the jump to an entirely different chemical system, plasmodicidal action

is exerted and there is no reason to believe that other chemical types might not be even more effective.

In addition to those who are already working on the production of drugs for antimalarial testing, there are many competent organic chemists now carrying on researches which have no very definite objective, whose activities might profitably be guided into lines of malaria therapy. Probably the same is true in the biological field. The fact that few of these investigators have shown interest in the malaria question may be due to the general ignorance of the seriousness of malaria as a national and world problem. A deterring factor for chemists also may be the lack of testing facilities, and for biological workers lack of a source of compounds to test.

There is an urgent need for coordination to bring such groups in contact and arouse their interest. Furthermore, the efforts of present workers should be coordinated in order to avoid duplication. This calls for the establishment of a mechanism whereby an investigator may be informed whether the drugs he is preparing or contemplating already have been tried. This is important especially in view of the fact that pharmaceutical houses publish very little of their chemical work, particularly when results are negative. Such coordination must be arranged in a way that will not deter commercial laboratories from participating. It is suggested that the committee on chemotherapy of the National Research Council undertake this phase of the program.

Chemotherapeutic studies must comprise toxicity tests of both old and new drugs as well as their parasiticidal action both *in vitro* and *in vivo*. As far as previously known compounds are concerned, this will necessitate a considerable search of the literature, for many possibly effective compounds have been prepared and tested with other actions in mind and their toxicity already has been determined. In testing the parasiticidal action of a drug the methods of testing are conclusive only on the human subject. Initial tests (including the use of Warburg's apparatus) and tests in bird and monkey malaria infection may indicate therapeutic activity and yet the drug may be ineffective against human malaria; and a drug effective in man may give little or no indication of its efficacy when tested in other experimental hosts. It is believed, however, that all drugs that have so far shown any significant action in human malaria have been effective to some degree in bird malaria. Also, there has been a reasonable parallelism in strength of action on the two forms, so that it is probable that the activity in the bird is a fair index for the human form. If positive results are obtained in the bird, the prospect in man seems good, but the converse is not necessarily true.

II. BIOLOGY AND PHYSIOLOGY OF THE MALARIAL PARASITE

Further study of the parasitic cycle in the human host, both in the erythrocytic and the exo-erythrocytic phases, is indicated. On theoretical grounds assumption may be made of the existence of a period of development in fixed tissue cells, probably the macrophages. The existence of such a phase is suggested by the ready cure of malaria induced through blood inoculation as contrasted with the failure of the same therapeutic agents to produce a complete cure after infection with sporozoites. Treatment removes the parasite from the erythrocyte; its subsequent return during a relapse suggests the existence of a resistant reservoir of infection outside the red blood cell. In connection with chemotherapeutic investigations it is essential that there be an elucidation of this exo-erythrocytic phase. In particular, it is important that a rapid and reliable method be developed for demonstrating specific action of a drug against the sporozoite.

A study of the affinity of the sporozoite for stains might guide the chemist to a knowledge of the types of chemical groups most likely to attack the parasite in this stage.

Very little is known of the metabolism of the parasite. A determination of its nutritional requirements is needed in order to provide more exact information for the testing of antimalarial drugs. It is possible that intensive investigation through such measures as the utilization of Warburg's technique will afford information as to the food requirements and byproducts of parasitic growth, and these may yield a definite lead to a new point of attack.

Perhaps more information concerning the pigment produced in the blood cell would throw light on the life process in the cell.

Nothing is known of the parasite's histiotaxis. What influences the migration of or possibly transports (by engulfing?) the sporozoite to cells outside of the blood stream, and what causes the migration of the trophozoite to the red blood cell? Does the exo-erythrocytic phase stem wholly from the original sporozoite infection, or do some trophozoites invade cells other than the erythrocyte? Elucidation of these questions is fundamental to a complete understanding of the parasitic cycle.

No culture medium is known for the parasites other than their vertebrate hosts. Reaction of the parasite to change in environment could be studied best in culture. Although some attempts have been made to secure growth in embryonic tissue there has been no serious effort to explore the possibilities of tissue cultures. The utility of both tissue cultures and cultures in synthetic media should be investigated as lack of a culture medium is the greatest single hindrance to experimental study of the parasite.

In the same connection it may be pointed out that the next greatest deficiency for experimental work is the lack of a cheap and susceptible laboratory animal. *Plasmodium knowlesi* is available in the monkey but the transmitting agent is unknown and, therefore, naturally inoculated infections cannot be studied. *Plasmodium cynomolgi* infects rhesus monkeys and is transmitted by *Anopheles quadrimaculatus;* but this monkey is not cheap. nor is colony rearing of *A. quadrimaculatus*. Canaries can be naturally infected with *Plasmodium cathemerium* and *Plasmodium relictum,* but these birds have so little blood that the course of the malarial infection is greatly influenced by the withdrawal of even a small quantity of blood necessary for periodic examination. Malaria parasites are found in pigeons but, as in *knowlesi,* the transmitting mosquito has not been found. *Plasmodium gallinaceum* of chickens is unknown in this country and should not be introduced, as its spread into domestic fowls would result in serious economic losses.

The smaller vertebrates should be thoroughly explored for autochthonous infection by the examination of wild-caught animals and those from zoological gardens, in a search for unknown parasite species that might be propagated in the laboratory. Further attempts should be made to infect smaller vertebrates with human parasites.

III. IMMUNOLOGICAL STUDIES

Immunology offers an approach to the relation between the parasite and its host, and its study may lead to new diagnostic methods. Its relation to the nutrition of the host may be productive of valuable fundamental knowledge. For instance, it is known that with recovery a specific immunity is produced to the existent strain, less to other strains of the species, and none to other species. Ultraviolet irradiation of malarial blood produces a delayed infection. If this is repeated a number of times it may produce an attenuated strain which might make it possible to develop a vaccine. Similar studies, coupled with attempts at serum therapy, may produce valuable information in relation to chemotherapeutic studies, and possibly to an efficient serum therapy for the disease.

IV. BIONOMICS AND ECOLOGY OF ANOPHELINES

The present attack on mosquitoes has been largely directed to the aquatic larvae, utilizing drainage and application of larvicides. Investigations of the bionomics of different anophelines have revealed specific habits which have led in certain instances to the development of other and less costly methods of control. For example, *Anopheles minimus* and allied species have been controlled in some areas by the dense shade of quick-growing bushes which inhibits their breeding.

There is a recent example of the control of *Anopheles gambiae* in a section of northern Brazil. Here this species was resting in the daytime exclusively in human habitations, and control was accomplished by weekly sprayings inside houses with an insecticide. In 10 weeks this single measure reduced the *A. gambiae* index to zero. It is probable that a more complete investigation of all the habits of vector species would yield information that might suggest other points of attack. It is of great importance to devise a method of attack exclusively effective against mosquitoes but which will not be deleterious to other forms of wildlife of economic value.

At present numerous studies along the above lines are being presented but their number is inadequate. Such studies might be planned in both controlled and natural environments. The required personnel should be competent in the fields of entomology and botany, able to explore all physical conditions and make chemical analysis of the environment, to study the microflora and fauna of the water and the physiology of the mosquito. These studies should accompany a careful investigation of the natural history of the insect itself in an attempt to locate the most vulnerable point in the vector's life history.

Colony rearing of anopheline species gives opportunity to study the biological requirements of a species under controlled conditions, which may advantageously precede field studies.

A more complete study of the adult should also be undertaken, to the end that no possible point of attack be overlooked. Much more knowledge is needed as to the factors that have to do with feeding, flight, and oviposition habits. There are, too, certain gaps in existing knowledge of the infection in mosquitoes as, for example, the cause of marked individual and specific differences in susceptibility. Recent developments have shown also the possible significance of slightly differentiated anopheline races. A highly important phase of both the larval and adult studies is the matter of natural control and other limitations to anopheline production.

Finally, there is need for applied research looking to improvement of methods used in the application of existing knowledge. Such studies would be concerned with control procedures based on physical methods utilizing hydrologic, larvicidal, and insecticidal measures.

In proportion to the magnitude of the problem and to the health and economic losses due to malaria, relatively small amounts of money are being expended to advance our fundamental knowledge of the disease. The extended coordinated program which the Conference has recommended necessitates the provision of additional funds and bringing into the field of malaria research added personnel with special qualifications in the several disciplines.

SUMMARY

The following outline summarizes the lines of investigation suggested:

I. *Chemotherapy*
   1. Synthesis of known drugs and systematic collection of samples available in laboratories throughout the country
   2. Synthesis of new drugs
      a. Toxicity of drugs
      b. Parasiticidal action of drugs
         1. *In vitro*
         2. *In vivo*
         3. Method of demonstrating action on sporozoites
   3. Coordination of results to minimize duplication

II. *Biology and physiology of the parasite*
   1. Cycle in human host
      a. Exo-erythrocytic phase
   2. Metabolism
      a. Nutritional requirements
      b. Histiotaxis
   3. Parasite cultures
      a. Tissue cultures
      b. Synthetic media
   4. Search for new experimental hosts

III. *Immunological studies*
   1. Vaccines
   2. Serum therapy

IV. *Bionomics and ecology of anophelines*
   1. Interrelated factors in larval production
      a. Entomological, botanical, physiological, chemical
      b. Food requirements
      c. Natural control agencies
   2. Adult ecology
      a. Tropisms (as related to hosts, flight, and oviposition habits, etc.)
      b. Natural controls
      c. Conditions influencing infectivity
   2. Specificity
      a. Comparative morphology
      b. Biological differences
      c. Relative susceptibility to plasmodial infection

It is realized that the foregoing is but an incomplete outline of essential research in the field of malaria. It was not the purpose of the Conference to formulate a program of research but rather to discover opportunities for coordinated effort in a program toward broader horizons of thought and research service. Hence three thoughts have guided the preparation of this report: First, the very apparent and compelling need for drawing together the natural and medical sciences in joint efforts to acquire basic knowledge upon which

to develop more effective control, as, for example, in the field of malaria therapy for the control of infection *per se;* second, that those interested in the suppression of malaria may be stimulated to an awareness of the broad gaps in present knowledge of the disease and to constructive efforts directed to closure of these gaps; third, that those undertaking studies in malaria give greater consideration to the completeness of particular programs of study rather than to the diversity of studies within particular groups.

RHEUMATIC HEART DISEASE IN PHILADELPHIA HOSPITALS [1]

A Study of 4,653 Cases of Rheumatic Heart Disease, Rheumatic Fever, Sydenham's Chorea, and Subacute Bacterial Endocarditis, Involving 5,921 Admissions to Philadelphia Hospitals From January 1, 1930, to December 31, 1934

IV. INFLUENCE OF SEASON AND CERTAIN METEOROLOGICAL CONDITIONS

By O. F. Hedley, *Surgeon, United States Public Health Service*

REVIEW OF LITERATURE

Over 250 years ago Thomas Sydenham (1634–1689) wrote concerning acute rheumatism "This disease happens at any time but especially in the autumn" (*1*). Since then inquiries instituted by a number of students of this problem have attested the correctness of this observation in Great Britain. According to table 1, the consensus of a number of experienced observers indicates that both rheumatic fever and chorea in that country occur with greatest frequency during the fall months or in December, while there is fair agreement that these conditions are least frequent during the spring and early summer. The seasonal distribution of chorea follows the same general pattern as rheumatic fever, except that the variations are perceptibly less.

The regular occurrence of peaks in the incidence of these diseases coincident with the onset of cold weather and the period of greatest precipitation has tempted some writers to suggest a causal relationship between these events. Rowlands (*27*) has attempted to correlate the greatest frequency of rheumatic fever with changes in temperature and barometric conditions. Young (*28, 29*) noted that there was a tendency for excessive rainfall to be associated with an increase in the death rate from rheumatic fever. He also indicated that mortality from this disease was highest in the counties of England and Scotland with the greatest rainfall. He postulated that there is presumably an increased prevalence of rheumatic fever with increased rainfall.

[1] From the Division of Infectious Diseases, National Institute of Health.

Table 1.—*Seasonal distribution of rheumatic manifestations in Great Britain*

Rheumatic manifestation	Place	Source	Number of attacks	Greatest frequency	Least frequency	Author	Years	Reference
Acute rheumatism	London	Private practice	146	December–April	September October	Haygarth	1805 [1]	(2)
Acute rheumatic fever	do	Guy's Hospital	591	October–December	August	Newsholme	1874–75 and 1892–94	(3)
Do.	do	Middlesex Hospital	801	November–December	July	do.	1874–97	(3)
Acute rheumatism (all attacks).	do	London Hospital	2,000	Last quarter with slight secondary rise in July.	March	Gabbett	1873 81	(4)
Acute rheumatism (first attacks).	do	do	738	Last quarter with more marked secondary rise in July.	April	do	1873–81	(4)
Rheumatic fever and chorea.	Glasgow	Combined data of 3 hospitals.	459	September–February with maximum in November.	June	Medical Research Council.	1919–21	(5)
Fatal rheumatic carditis.	Bristol	Death certificates		December–January	July and September	Coombs	1876–1913	(6)
Juvenile rheumatism and chorea.	London	Several hospitals and clinics.	250	November–April	May–August	Campbell and Warner	1930 [1]	(7)
Rheumatic arthritis	do	Hospital for sick children.	111	December	March	Poynton, Paterson, and Spence.	1919–20	(8)
Chorea	do	do	104	do	do	do	1919–20	(8)
Do	do	do	215	Winter	Spring	Sturges	1876–87	(9)
Rheumatic arthritis	Glasgow	Royal Hospital for Sick Children.	160	October	March–July; June lowest.	Findlay	1914–30	(10)
Chorea	do	do	144	December	June	do	1914–30	(10)

[1] Year of publication.

Newsholme (*3*, *30*), as a result of painstaking epidemiological investigations based on morbidity and mortality reports collected from a number of sources over many years, inferred that a high incidence of rheumatic fever was associated with high mean atmospheric and soil temperatures, low rainfall, and low ground water. He stated: "I have collected similar evidence for foreign countries, all of which tends to confirm the conclusion that a heavy rainfall is usually associated with a low amount of rheumatic fever, and a small rainfall with an excessive amount of rheumatic fever, though no exact proportion between the two factors can be predicted. It is certain, however, that 2 or 3 years of deficient or excessive rainfall are more potent than a single year."

Newsholme (*30*) attributed the tendency to ascribe a causal relationship between seasons of inclement weather and the frequency of rheumatic fever to a lack of precise terminology for describing rheumatic diseases. Since this situation still prevails it seems appropriate to quote his views in their entirety:

> The confusion between chronic forms of "rheumatism" and rheumatic fever is, however, probably the chief cause of this serious error. Probably the mental evolution of the idea that "damp" produces or aggravates rheumatism is as follows. It has long been recognized in old rhyme that among the other signs of on-coming rain, such as—
>
> "The distant hills are seeming nigh
> *　　*　　*
> Low o'er the grass the swallow wings"
>
> there is the pathological sign that—
> "Old Betty's joints are on the rack."
>
> The reason would be as follows: Changes of weather cause pain in joints. These pains are "rheumatic" in character. Hence damp and wet favor the onset of "rheumatism." But rheumatic fever is simply an acute form of "rheumatism." Hence rheumatic fever must be more common in wet weather. It is but a step in the unconscious growth of a doctrine to suppose that—inasmuch as dampness favors rheumatism—a damp soil must have the same effect, and that, for instance, a clay soil is more conducive to attacks of rheumatic fever than a gravel soil. The primary error consists in assuming that there is any pathological or etiological relationship between the heterogeneous diseases known as chronic rheumatism and the specific febrile disease, rheumatic fever.

Based on mean weekly deaths in London over a 20-year period, Longstaff (*31*) noted that rheumatic fever, erysipelas, and puerperal fever showed an almost similar seasonal distribution. The greatest number of deaths from rheumatic fever occurred during November, the least during the late spring and early summer. He indicated that rheumatic fever, and the diseases compared with it, showed a rough inverse relationship to rainfall, but that this was not so marked in the latter period (1881–1900) as in the earlier period (1856–80) under

study. Although a dry summer appeared to favor epidemics of rheumatic fever, this relationship was not invariable. The seasonal distribution of scarlet fever was in many respects comparable to rheumatic fever, erysipelas, and puerperal fever. There was apparently no relationship between the seasonal incidence of these diseases and that of diphtheria and typhoid fever. The geographic distribution of deaths from rheumatic fever appeared to be due to density of population rather than to cold, wet, or chills.

The present writer suggests caution in too readily accepting inferences concerning the relation of season or meteorological conditions to rheumatic fever, based on studies of mortality returns. The case fatality rate in rheumatic fever is relatively low. In another article in this series it is placed at 3.5 to 4.5 percent; other writers place it at 2 percent or even lower. Consequently, studies of this type are likely to be based on a small and by no means representative sample.

Gabbett (*4*) found that in London acute rheumatism was most common during October and November, while the heaviest rainfall occurred during August and October. He expressed the opinion that the disease was neither most prevalent during the coldest or least frequent during the warmest season. In contradistinction to Rowlands' (*27*) findings, his studies do not suggest that it occurs with greatest frequency during the months in which variations in temperature are greatest. The disease was more common toward the end of autumn, coexistent with a low, or at least a falling, temperature and increased rainfall. He concluded that although there is a certain correspondence between the rainy periods and times when acute rheumatism is common, it is not close enough to point to any necessary connection.

Greenwood and Thompson (*32*) indicate marked seasonal variations in admissions for acute rheumatism in London hospitals The disease was most prevalent during the fall, with the peak in November; it was minimal in May. The admission rate from January to June was below the base line, and for the rest of the year above it. No correlation was obtained between admissions for rheumatic fever and temperature and rainfall. Except for August no correlation was noted between admissions for rheumatism and barometric conditions.

In contrast to the seasonal distribution in Great Britain, the experience of most American observers indicates that the greatest frequency of rheumatic infection occurs during the late winter and spring months (table 2). Most students place the greatest frequency in April, although some find that it occurs as late as May. The least number of cases develops during the late summer and fall.

TABLE 2.—*Seasonal distribution of rheumatic manifestations in the United States*

Rheumatic manifestation	Place	Source	Number of attacks	Greatest frequency	Least frequency	Author	Years	Reference
Acute inflammatory rheumatism.	Philadelphia.	Pennsylvania Hospital.	673	April	Autumn	Lewis	1876-90	*(11)*
Chorea	do	Orthopedic Hospital	717	March	November	do	1876-90	*(11)*
Do	Boston	Massachusetts General Hospital.	666	April	Autumn	do	1876-90	*(11)*
Do	New York	Vanderbilt Clinic	356	do	October-December	Storr	1885-92	*(12)*
Rheumatic infection in children.	do	Bellevue Hospital	584	April with nearly as many in May.	October	Sutton	1923-27	*(13)*
Rheumatic fever	do	do		May	do	do	1923-27	*(13)*
Chorea	do	do		April	November	do	1923-27	*(13)*
Rheumatic fever	Cincinnati	Cincinnati General Hospital.	456	March	August and September.	Mills	191[illegible]-33	*(14, 15)*
Rheumatic infection	New York	Montefiore Hospital	53	January-March	September-October	Boas and Schwartz	1921-26	*(16)*
Rheumatic state	do	Columbia-Presbyterian Medical Center.		April and May	July and September	Coburn	1923-29	*(17)*
Rheumatic fever	St. Louis	Washington University.	150	Spring	Summer	McCulloch and Irvine-Jones.	1929 [1]	*(18)*
Do	Boston	House of Good Samaritan.	1,209	January and April	August and September.	Jones and Bland	1921-35	*(19)*
Chorea	do	do	671	do	do	do	1921-35	*(19)*
Rheumatic infection	Portland, Oreg.	Doernbecher Hospital.	116	February and March	July	Bilderback and Overstreet.	1933-38	*(20)*
Rheumatic fever and chorea.	San Francisco.	Several sources	95	January, February, and April.	do	Christie	1930-35	*(21)*
Rheumatic disease	Rochester, N. Y.	Survey	1,085	Late winter and spring, with maximum in May.	November-December.	Kaiser	1934 [1]	*(22)*
Childhood rheumatism	Minneapolis.	Lymanhurst Heart Clinic.	708	March and April	July and August	Shapiro	1922-35	*(23)*
Rheumatic infection	New York	New York Cardiac Shop.	59	Spring	Summer	Juster	1929-31	*(24)*
Juvenile rheumatism	Oklahoma City.	University and Children's Hospital.	122	January and February	June and November	Pounders and Gray	About 8 years prior to 1939.	*(25)*
Rheumatic infection	Philadelphia.	Children's Heart Hospital.	[2] 457	March	July	Strond, et al	1922-32	*(26)*

[1] Year of publication.
[2] Rheumatic manifestations.

One of the earliest studies in this country on the relationship between season and rheumatic fever and chorea was made by Lewis (*11*) in Philadelphia covering the period 1876-90. The greatest frequency of 674 separate attacks of acute rheumatism occurred in April; the fewest in September. On breaking down the 15 years under study into 5-year periods, the seasonal distribution appeared quite constant except that the seasonal variations were less marked during 1886–90 than during the two previous 5-year periods.

The greatest frequency of 717 separate attacks of chorea in Philadelphia during 1876–90 was in March, the least in November. The height of curves indicated slightly greater seasonal variations than encountered during 1930 34. Fourteen and one-tenth percent occurred during March, only 3.3 percent during November. It is noteworthy that during these 15 years the seasonal variations became less marked Furthermore, during the 5-year period 1886 90 this disease was slightly more frequent during June than during March.

In a more recent study in Philadelphia, Stroud and his associates (*26*) state that the greatest frequency of primary manifestations and reactivations of rheumatic infection among patients admitted to the Children's Heart Hospital occurred during March, the least during July. Their studies indicate that over 60 percent of rheumatic activity occurs during January to May, inclusive.

Sutton (*13*) observed that in New York the greatest frequency of all forms of rheumatic infection occurred in April with nearly as many in May; the lowest frequency was in October. The maximal frequency of rheumatic fever was in May, the minimal in October. The greatest number of cases of chorea developed in April, the fewest in October. Sutton was unable to establish a correlation between mean temperature, rainfall, and the seasonal or annual frequency of rheumatic conditions. It was noted that the rheumatic season reaches its height at the time of the year in which the temperature is rising, a finding contrary to that to be expected if Young's conclusions (*27*, *28*) have a general applicability. Sutton also noted that during the 5-year period 1923–27 the years with the lowest precipitation and highest mean annual temperatures were attended by the greatest number of admissions to the children's wards of the Bellevue Hospital.

Jones and Bland (*19*), in a review of a series of 1,209 attacks of rheumatic fever and 671 of chorea, describe a slight increase in November coincident with the beginning of cold weather, a higher peak in January followed by an appreciable decline, and an even greater rise in March, when the greatest frequency is indicated. These writers point out the similarity of the seasonal distribution of rheumatic fever and chorea. Seasonal variations of chorea are not as great, however. Poynton, Paterson, and Spence (*8*), in Great Britain, have

also observed this close parallel, as did Lewis (*11*) in Philadelphia many years ago.

According to Newsholme (*30*), who gives a table showing differences in seasonal frequency in a number of cities, the periods of greatest and least occurrence on the continent of Europe fall in a position intermediary between that commonly observed in Great Britain and in the United States. In some instances the seasonal distribution approaches that of the United States The greatest frequency in Christiana, Norway, Stockholm, Sweden, and Kiel, Germany, was in January, while in Munich, Germany, and Helsinki, Finland, it occurred during March to May. The minimum occurrence in all of these cities was during July to September.

Wilson and Swift (*33*) demonstrated over a period of 4 years that, although the greatest amount of rheumatic activity occurred during the spring, considerable variations were noted. This is only to be expected of an essentially chronic disease with not infrequent acute exacerbations. Boas and Schwartz (*16*) noted that the greatest amount of rheumatic infection develops during January to March. Juster (*24*), using an objective method for determining rheumatic activity based on leucocyte counts, found that the greatest degree of rheumatic activity tended to develop during the spring. This was not invariable, however.

SEASONAL DISTRIBUTION OF RHEUMATIC FEVER

In Part II of this series of articles the relationship of admissions to cases was discussed in detail, and some of the fallacies arising from considering each admission as a distinct entity were indicated. Although there is not as great opportunity for error in a study of seasonal distribution as in studies of the age, race, and sex of clinical cases, there is a possibility that a rapid succession of admissions might result in erroneous conclusions. For this reason and for the sake of uniformity, only the initial admission during the 5-year period of each case, including the cases which terminated fatally, was used in determining the seasonal distribution.

According to figure 1 and table 3, the period of greatest occurrence of admissions involving rheumatic fever was in the spring, with the peak in April, when 14.3 percent occurred. Nearly as many cases, 13.7 percent, were admitted during May, with 11.7 percent in March, and 10.5 percent as late as June. Nearly 40 percent of the admissions were during the spring months. The least frequency was in the fall; the minimum, 3.5 percent, was in October. A slightly higher percentage was noted in November than in December.

The seasonal distribution of these 1,324 admissions involving rheumatic fever is similar to that reported by most writers in this country. The seasonal variations are not as great as noted by Mills

(*14, 15*), who recently indicated that admissions for rheumatic fever are over six times more common in Cincinnati during March than during August and September. Although there is a slight increase in admissions coincident with the onset of cold weather, the marked rise in January reported by Jones and Bland (*19*) was not evident.

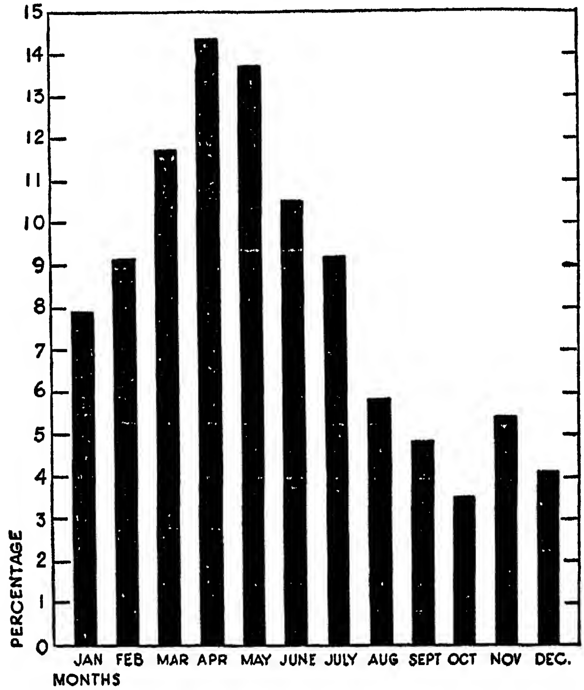

FIGURE 1.—Percentage distribution by months of 1,324 cases of rheumatic fever in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on month of initial admission during the period under study. Months adjusted to 30-day basis.

TABLE 3.—*Distribution by months of 1,324 initial admissions, during the period under study, of rheumatic fever in Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Month	Rheumatic fever with rheumatic heart disease		Rheumatic fever without rheumatic heart disease		All rheumatic fever	
	Number	Percent	Number	Percent	Number	Percent
January	69	8.2	37	7.5	106	7.9
February	69	9.1	41	9.2	110	9.1
March	101	12.0	55	11.2	156	11.7
April	118	14.5	66	13.9	184	14.3
May	115	13.7	67	13.6	182	13.7
June	93	11.4	43	9.0	136	10.5
July	68	8.1	54	11.0	122	9.2
August	44	5.2	33	6.7	77	5.8
September	37	4.5	25	5.3	62	4.8
October	33	3.9	13	2.6	46	3.5
November	41	5.0	29	6.1	70	5.4
December	36	4.3	19	3.9	55	4.1
Month unknown	14	----------	4	----------	18	----------
Total	838	100	486	100	1,324	100

Lewis (*11*), in a study of 673 admissions for rheumatic fever in Philadelphia during the 15-year period 1876–90, noted a more definite peak of admissions during April. Admissions were relatively infrequent during the autumn months and minimal in September. With these possible differences, the seasonal distribution has remained essentially unchanged in Philadelphia over a half century.

Rheumatic fever without clinically detected rheumatic heart disease undergoes seasonal variations comparable in most respects to rheumatic fever with cardiac involvement (table 3). The height of occurrence of both of these conditions was in April, the least in October. Slightly greater frequency in November was noted in both groups. The only appreciable difference was a slightly higher percentage of admissions for rheumatic fever without heart disease in July.

SEASONAL DISTRIBUTION OF SYDENHAM'S CHOREA

The distribution by months (fig. 2 and table 4) of initial admissions during the 5-year period of 687 cases of chorea indicates that the period of greatest frequency occurs during the first 8 months of the

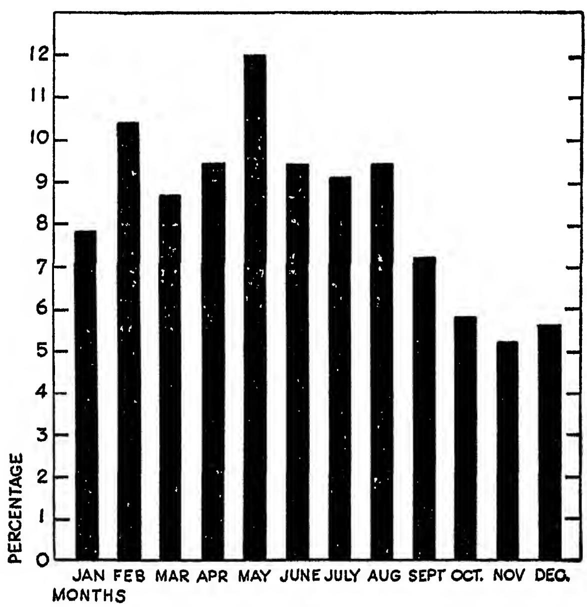

FIGURE 2.—Percentage distribution by months of 687 cases of Sydenham's chorea in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the month of initial admission during the period under study. Months adjusted to 30-day basis.

year, from January through August, with the maximum in May. Considerably fewer admissions were noted during the fall months and December, although during that month a slight increase occurred. November shows the fewest admissions.

Seasonal variations of chorea are not as great as of rheumatic fever (compare figs. 1 and 2). Beyond the fact that these conditions are most prevalent during the spring and least prevalent during the fall, the seasonal distribution is not readily comparable. The greatest frequency of chorea occurs during May, of rheumatic fever during April. Chorea is least prevalent in November, rheumatic fever during October. Greater variations are noted in admissions from month to month from chorea than rheumatic fever. The seasonal variations are not as great. There were over four times as many admissions for rheumatic fever in April as in October; there were only twice as many for chorea in May as in November.

The seasonal distribution of Sydenham's chorea in Philadelphia hospitals does not exhibit as close a similarity to rheumatic fever or all rheumatic infection as indicated by Jones and Bland (*19*), Poynton, Paterson, and Spence (*8*), and other writers. Even Sutton (*13*), whose findings were in many ways not dissimilar to the present study, demonstrated a greater similarity in the seasonal distribution. Findlay (*10*), in Great Britain, noted only a general comparability.

Studies conducted under the auspices of the British Medical Research Council (*5*) revealed comparatively little similarity in the seasonal frequency of these conditions. In a comparatively small series of cases of chorea, January showed the most attacks, June the fewest. In addition to the maximum in January, smaller peaks were noted in April and September, corresponding to the end of the school holidays. It was inferred that nervous strain might be responsible in part for variations in the frequency of chorea. Secondary peaks coincident with the termination of school vacations were not observed in Philadelphia. It is worthy of note that increases in admissions occurred in February, just after the first semester examination period, and in May, just before the final examinations. It is unlikely that these are more than coincidences, since if nervous strain were an important factor a more rapid decline in admissions for chorea would be expected during the summer months. Another factor militating against this contingency is that the seasonal distribution of chorea with heart disease showed a greater tendency to correspond to periods of possible stress and strain during the school year than simple Sydenham's chorea without definite organic cardiac involvement (table 4). Were nervous influences an important consideration, the converse would be expected.

TABLE 4.—*Distribution by months of 687 initial admissions during the period under study of Sydenham's chorea in Philadelphia hospitals from January 1, 1930, to December 31, 1934. Percentages adjusted to 30-day basis*

Month	Chorea with rheumatic heart disease		Chorea without rheumatic heart disease		All chorea	
	Number	Percent	Number	Percent	Number	Percent
January	18	6.1	36	9.0	54	7.8
February	32	12.1	33	9.2	65	10.4
March	23	7.8	37	9.3	60	8.7
April	33	11.6	30	7.6	63	9.4
May	37	12.6	16	11.5	83	12.0
June	28	9.9	35	9.1	63	9.4
July	21	7.2	42	10.5	63	9.1
August	30	10.2	35	8.8	65	9.4
September	16	5.6	32	8.3	48	7.2
October	18	6.1	22	5.5	40	5.8
November	12	4.2	23	6.0	35	5.2
December	19	6.5	20	5.0	39	5.6
Month undetermined	2		7		9	
Total	289	100	398	100	687	100

SEASONAL DISTRIBUTION OF RHEUMATIC HEART DISEASE

The seasonal distribution of rheumatic conditions as a whole and rheumatic heart disease, with or without subacute bacterial endocarditis as a complicating factor, is shown in table 5. Admissions for each of the conditions described in table 5 are most common in the spring and least common during the fall. For each of them the greatest frequency is indicated in April, the least during September or October.

TABLE 5.—*Distribution by months of the initial admissions during the period under study of 4,653 cases of rheumatic heart disease, rheumatic fever, chorea, and subacute bacterial endocarditis, 4,538 cases of rheumatic conditions exclusive of subacute bacterial endocarditis not superimposed on rheumatic heart disease, 3,654 cases of rheumatic heart disease including 209 cases of subacute bacterial endocarditis superimposed on rheumatic heart disease, and 3,445 cases of rheumatic heart disease not complicated by subacute bacterial endocarditis to Philadelphia hospitals from January 1, 1930, to December 31, 1934. Percentages adjusted to basis of 30-day months*

Month	All conditions under study		All rheumatic conditions		Rheumatic heart disease, including subacute bacterial endocarditis as complication		Rheumatic heart disease exclusive of subacute bacterial endocarditis	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	410	8.8	397	8.7	324	8.8	298	8.6
February	407	9.6	399	9.7	325	9.8	312	10.0
March	463	9.9	455	9.9	363	9.9	339	9.8
April	488	10.8	477	10.8	381	10.7	365	10.9
May	491	10.5	483	10.6	370	10.1	359	10.3
June	437	9.6	423	9.6	345	9.7	327	9.7
July	396	8.4	389	8.5	293	8.0	273	7.9
August	323	6.9	315	6.9	247	6.7	229	6.6
September	289	6.4	281	6.4	224	6.3	207	6.2
October	291	6.2	281	6.1	246	6.7	233	6.7
November	300	6.6	290	6.6	238	6.7	219	6.5
December	297	6.3	287	6.3	248	6.7	238	6.9
Month unknown	61		61		50		46	
Total	4,653	100	4,538	100	3,654	100	3,445	100

The distribution by months of 3,445 admissions involving rheumatic heart disease exclusive of subacute bacterial endocarditis is shown in figure 3. As mentioned above, the seasonal occurrence is quite comparable to the other conditions listed in table 5. A fairly smooth curve is indicated, with the period of greatest frequency in the spring, maximal in April. Admissions from this cause were least frequent during the fall, minimal in September. Although there are perceptibly more admissions with rheumatic heart disease toward the

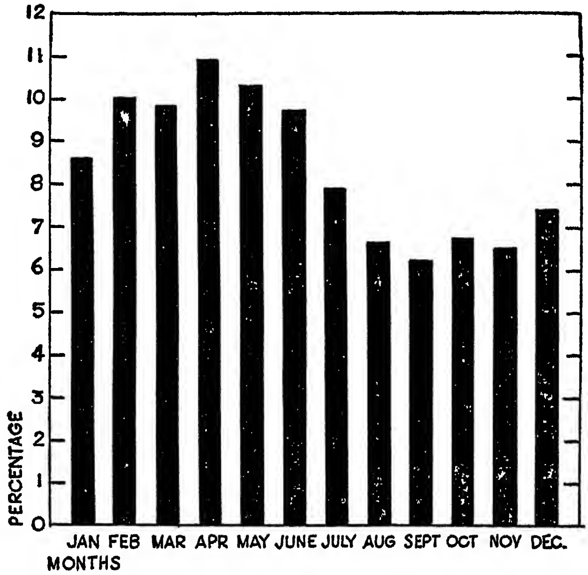

FIGURE 3.—Percentage distribution by months of 3,445 cases of rheumatic heart disease in Philadelphia hospitals from January 1, 1930, to December 31, 1931, based on the month of initial admission during the period under study. Months adjusted to 30-day basis

end of the cold season than during the summer and autumn, seasonal variations are not as great as for rheumatic fever and chorea.

Most of the admissions involving rheumatic heart disease were for actual or impending congestive heart failure due either to rheumatic infection or to other causes, principally mechanical difficulties because of valvular diseases, auricular fibrillation, the superimposition of arteriosclerotic processes, or myocardial fatigue. Cardiac failure from almost any cause is not infrequently initiated by respiratory infections. Furthermore, the onset of congestive failure usually antedates admission to hospital by at least several weeks. This suggests that the onset of cardiac insufficiency coincides more nearly with the coldest time of the year.

Patients with nearly every type of heart disease withstand poorly the rigors of winter and its attending respiratory infections. Bean and Mills (*34*) recently presented data which suggests that this is

especially true of rheumatic and arteriosclerotic heart disease, in contradistinction to cardiovascular syphilis in which failure is likely to occur with almost equal frequency during any season. Since admissions involving rheumatic heart disease are for the most part due to rheumatic infection, which has a predilection for the spring months, or for congestive failure, which is either due to rheumatic infection or is in many instances at least initiated by respiratory infections, the seasonal variations are probably not as great as might be expected.

SEASONAL DISTRIBUTION OF MORTALITY FROM RHEUMATIC HEART DISEASE

The distribution by months of fatalities from rheumatic heart disease and subacute bacterial endocarditis, based on the month of death as determined by review of hospital records or death certificates, is shown in table 6. Although deaths from rheumatic heart disease occur with slightly greater frequency during the first 6 months of the year, seasonal variations are not as great as for admissions for rheumatic fever, Sydenham's chorea, and rheumatic heart disease. Only 57.5 percent of 916 deaths as compared with 67.2 percent of 1,324 admissions involving rheumatic fever and 59.3 percent of 4,538 admissions for all rheumatic conditions occurred during the first 6 calendar months. A certain seasonal variation cannot be denied, since deaths occurred in a proportion of more than two to one in April as compared with September.

TABLE 6.—*Distribution by months of deaths from rheumatic heart disease and subacute bacterial endocarditis among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934. Percentages adjusted to basis of 30-day months*

Month	Rheumatic heart disease, including subacute bacterial endocarditis as a complication		Rheumatic heart disease exclusive of subacute bacterial endocarditis		All subacute bacterial endocarditis		Subacute bacterial endocarditis on rheumatic heart disease		Subacute bacterial endocarditis not on rheumatic heart disease	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
January	87	9.5	77	10.5	23	8.0	10	5.3	13	12.5
February	86	10.4	73	11.1	20	7.6	13	7.7	7	7.5
March	89	9.7	71	9.7	24	8.3	18	9.7	6	5.8
April	101	11.4	76	10.8	37	13 2	25	13.9	12	12.0
May	69	7.5	61	8.3	13	4.5	8	4.3	5	4.8
June	80	9.0	65	9.2	23	8.2	15	8.3	8	8.0
July	70	7.6	57	7.8	24	8.3	13	7.0	11	10.6
August	73	8.0	54	7.4	25	8.6	19	10.2	6	5.8
September	49	5.5	33	4.7	20	7.1	16	8.9	4	4.0
October	66	7.2	50	6.8	22	7.6	16	8.6	6	5.8
November	68	7.7	51	7.2	27	9.6	17	9.5	10	10.0
December	59	6.4	47	6.4	26	9.0	12	6.5	14	13.4
Month unknown	19		17		4		2		2	
Total	916	100	732	100	288	100	184	100	104	100

The distribution by months of 916 deaths from rheumatic heart disease, including subacute bacterial endocarditis when occurring as a complication, is shown in figure 4, which indicates a rather rough curve with the greatest frequency in April and the least in September.

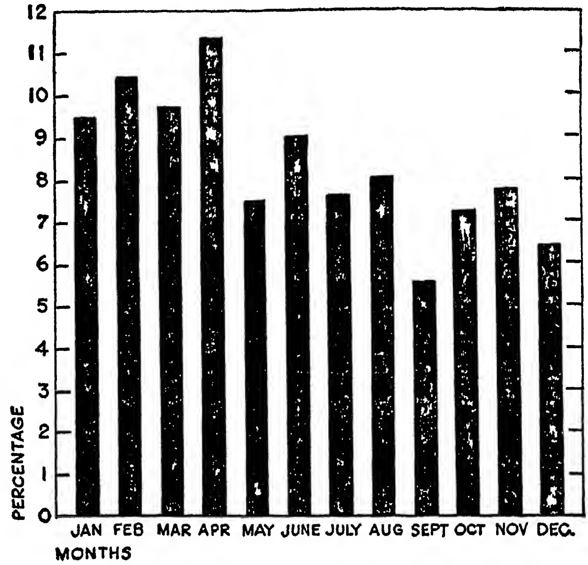

FIGURE 4.—Percentage distribution by months of 916 fatal cases of rheumatic heart disease, including 184 cases of rheumatic heart disease complicated by subacute bacterial endocarditis, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, and based on the month of death. Months adjusted to 30-day basis.

In figure 5 a comparison is made of the distribution by months of 732 deaths in Philadelphia hospitals from rheumatic heart disease, exclusive of subacute bacterial endocarditis, during the 5-year period 1930–34, with 30,583 deaths from heart disease and 122,433 deaths from all causes in Philadelphia during this period. This graph suggests that there is a greater seasonal variation of deaths from rheumatic heart disease than from all heart disease or deaths from all causes. Even when the curve for rheumatic fever is smoothed to overcome a possible source of error from a smaller number of cases, a greater seasonal variation is indicated.

In figure 6 a comparison is made of 732 deaths from rheumatic heart disease, exclusive of subacute bacterial endocarditis, among admissions to Philadelphia hospitals during the 5-year period 1930–34, with the monthly distribution of 5,116 deaths reported as due to acute coronary occlusion in Philadelphia during 1930–34 (*35*). The seasonal distributions of fatalities from these conditions have little in common. The greatest number of deaths from rheumatic heart disease occurs during the first four months of the year, reaching its maximum in April. Deaths from acute coronary occlusion occur with

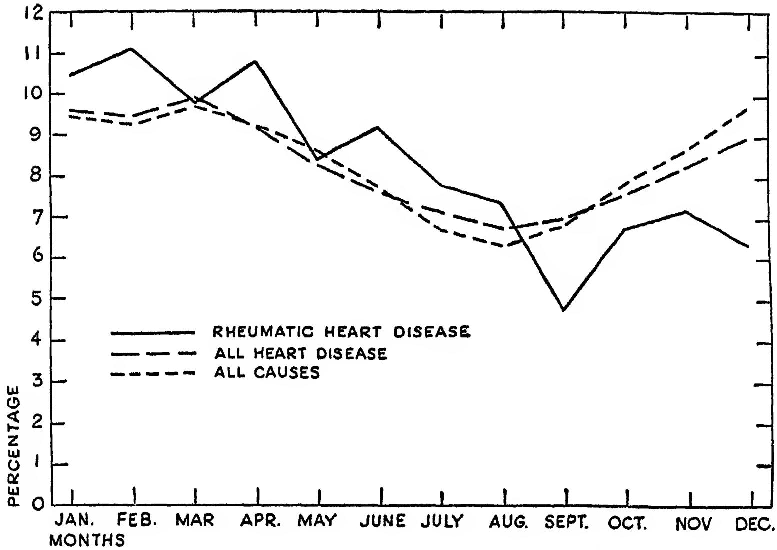

FIGURE 5.—Comparative percentage distribution of months of death of 732 cases of rheumatic heart disease, exclusive of subacute bacterial endocarditis, admitted to Philadelphia hospitals with 30,583 deaths from all heart disease and 122,133 deaths from all causes in Philadelphia from January 1, 1930, to December 31, 1934. Months adjusted to 30-day basis.

greatest frequency during the last three months of the year, with the peak occurrence in December. Deaths from rheumatic heart disease are least frequent during the fall, especially September; deaths from

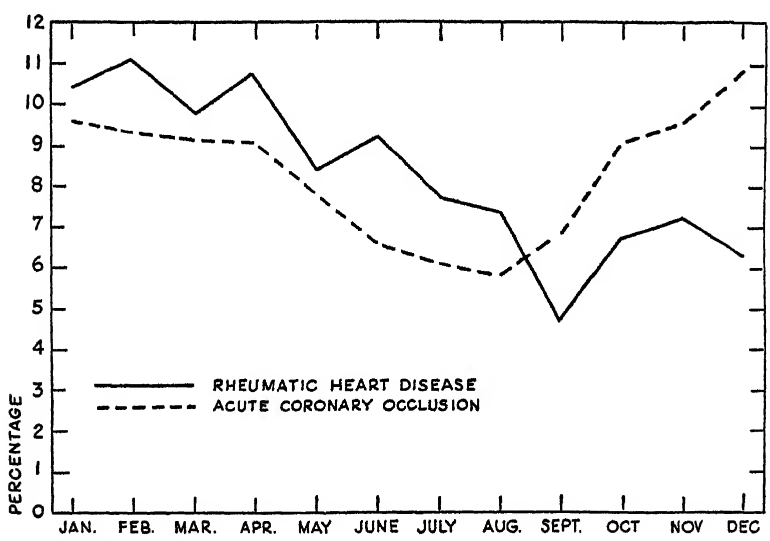

FIGURE 6.—Comparative percentage distribution of months of death of 732 cases of rheumatic heart disease, exclusive of subacute bacterial endocarditis, in Philadelphia hospitals from January 1, 1930, to December 31, 1934, with 5,116 deaths in Philadelphia from January 1, 1933, to December 31, 1937, reported as due to acute coronary occlusion. Months adjusted to 30-day basis.

acute coronary occlusion are least common during the summer, fewest in August. Since acute coronary occlusion is often rapidly fatal, the seasonal distribution of attacks is not dissimilar to that of mortality. Studies by Bean and Mills (34) attest this statement. This suggests that acute coronary occlusion is associated with the onset of cold weather, mortality from acute rheumatic heart disease with its continuation. A comparison of the seasonal distribution of acute coronary occlusion with rheumatic fever (fig. 1) and chorea (fig. 2) reveals an even greater lack of similarity.

Sixty-three patients with rheumatic heart disease apparently died during a first attack of rheumatic fever or chorea, or of rapidly fulminating rheumatic pancarditis unassociated with these conditions. The seasonal distribution of this relatively small number of fatal cases was approximately the same as admissions involving rheumatic fever.

SEASONAL DISTRIBUTION OF SUBACUTE BACTERIAL ENDOCARDITIS

There were 324 admissions involving subacute bacterial endocarditis. Of these, 215 were for subacute bacterial endocarditis engrafted on preexisting rheumatic heart disease; in 115 the relationship to rheumatic heart disease was not satisfactorily determined. Figure 7 suggests that there is no definite seasonal incidence of admissions from this cause. Certain variations are noted in the month-to-month percentage of admissions. These variations are probably due to the comparatively small number of admissions and lose their significance if the curve is smoothed, basing it on the mean of the month under observation, the preceding and succeeding months.

A similar situation obtains with regard to deaths from this condition. With the exception of a high percentage of deaths in April and a correspondingly low percentage during May, only slight monthly or seasonal variations are noted (fig. 8). Since there is no apparent explanation for the unusual incidence during these two months it is regarded as a coincidence. Apparently neither summer heat nor winter cold has much influence on the admissions or fatalities from this disease.

RELATION OF RHEUMATIC FEVER AND CHOREA TO CERTAIN METEOROLOGICAL CONDITIONS

The number of admissions involving rheumatic fever and chorea, mean temperature in degrees Fahrenheit, mean relative humidity, and inches of rainfall in each of the 60 months under study is shown in figure 9. As indicated in previous charts, seasonal fluctuations are much greater for rheumatic fever than for Sydenham's chorea. The seasonal distribution is subject to wide variations. The greatest

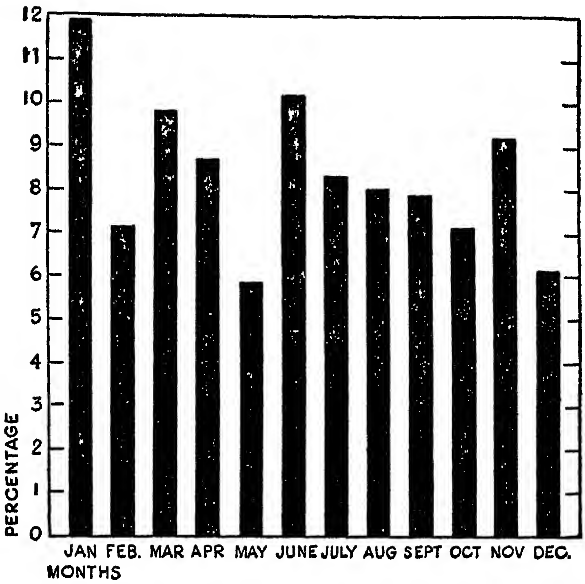

FIGURE 7.—Percentage distribution by months of 324 cases of subacute bacterial endocarditis in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the month of initial admission during the period under study. Months adjusted to 30-day basis.

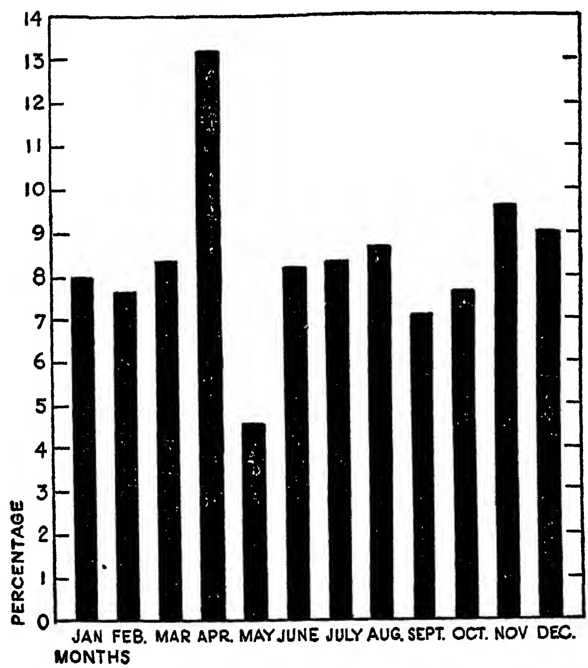

FIGURE 8.—Percentage distribution by months of 288 fatal cases of subacute bacterial endocarditis admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on month of death. Months adjusted to 30-day basis.

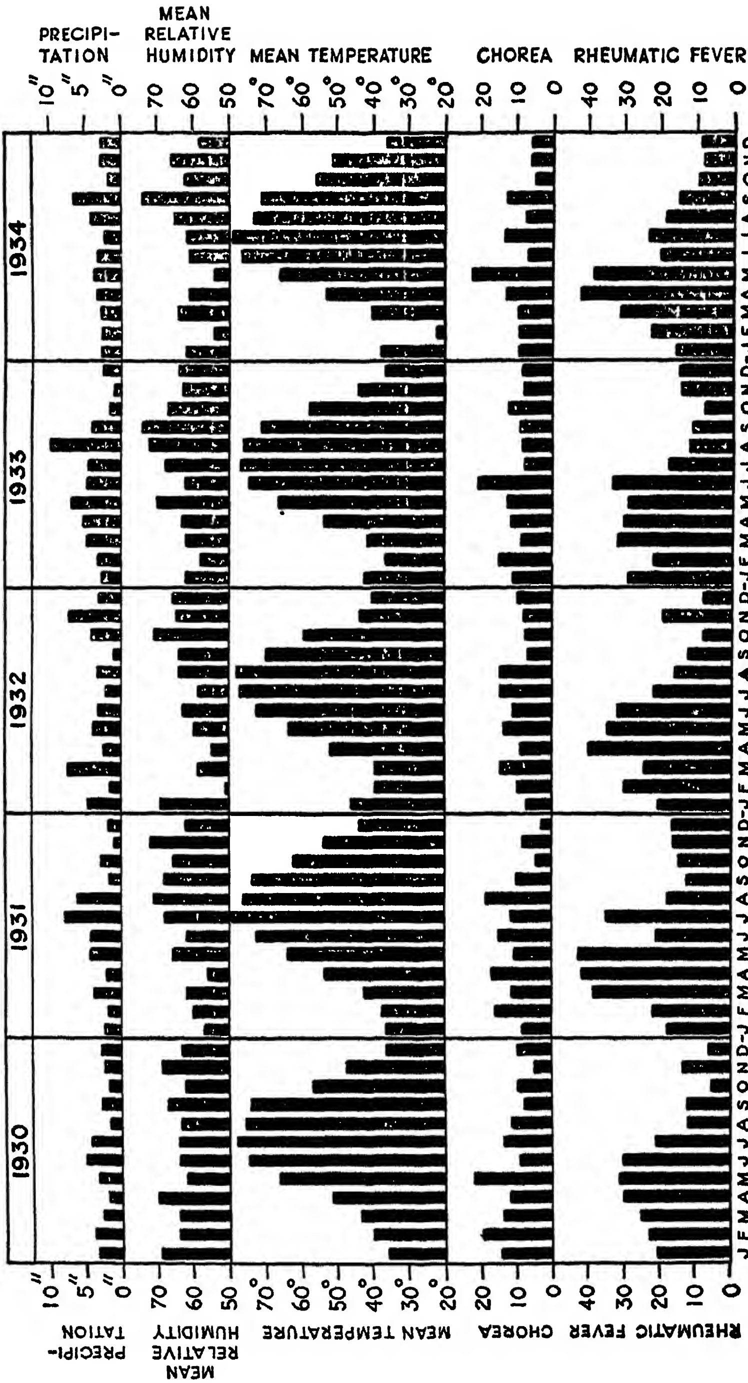

FIGURE 9.—Comparison of number of cases of rheumatic fever and chorea admitted to Philadelphia hospitals with mean temperature, mean relative humidity, and inches of precipitation in each month in the 5-year period from January 1, 1930, to December 31, 1934. Months adjusted to 30-day basis.

frequency of rheumatic fever occurred in 2 years during April, in 2 years during May, and in 1 year during June. Chorea was most frequent in 2 years during May, in 1 year during June, and in 1 year during July. During 1933 the number of cases was about the same for several months. In general, the first 6 months of the year is the period of greatest frequency of attacks of rheumatic fever, while considerably fewer attacks occur during the fall. The number of admissions involving chorea for each month over a period of 5 years shows even greater differences from year to year. Furthermore, there does not seem to be any outstanding relation between admissions for these diseases.

Despite a reasonably constant increase in admissions for rheumatic fever and chorea in the late winter and spring months, and even in June, admissions are not maximal during the coldest months of the winter nor minimal during the warmest months of the summer. This is in agreement with the observations of a number of writers, especially Gabbett (*4*) and Sutton (*13*). An unusually cold winter does not invariably result in unusually great increase in admissions for rheumatic fever during the succeeding spring. The comparatively mild winter of 1930–31 was followed by a large number of admissions for rheumatic fever during the spring, as was also the severe winter of 1933–34.

As a rule the greatest frequency of rheumatic fever preceded rather than followed a period of heavy precipitation. Following a relatively wet winter and spring, such as 1932–33, the increase in this disease was no greater than following comparatively dry winters and springs of other years. This observation was recently corroborated by Maddox (*36*), in Australia, who was able to demonstrate an absence of correlation between rainfall and admissions due to rheumatic fever in hospitals in Sydney. There also seemed to be little relationship between relative humidity and admissions from these causes.

In interpreting the influence of seasonal conditions it is well to bear in mind that the onset of rheumatic fever may antedate admission to hospital by as much as several weeks. Often the patient is not admitted until after home treatment has failed. Furthermore, since rheumatic fever is frequently preceded by upper respiratory infections, especially those due to hemolytic streptococci, and these infections precede the clinical onset of rheumatic fever by about 5 to 25 days, the initiating factor coincides more clearly with the coldest season of the year in many instances. On the other hand many cases develop during seasons in which upper respiratory infections are not so common.

Owing to the tendency for rheumatic infection to occur with greater frequency during the late winter and spring months and to its greater incidence among the poor, many attempts have been made to show an association with food deficiencies or imbalances. Theories have

been advanced attempting to ascribe a causal relationship between rheumatic fever and lack of vitamins or minerals, insufficient proteins, or an excess of carbohydrates. A detailed review of this literature is not considered within the purview of this article. It suffices to state that, although the field has not been fully explored, evidence at hand fails to incriminate improper diet as an etiological factor. The ingestion of diets rich in vitamins and other necessary foods does not alter the clinical course. Although a food deficiency may be a contributory factor it appears unlikely that a disease which possesses so many characteristics of an infection is due primarily to that cause.

It is also possible that prolonged lack of sunlight during the winter may be in part responsible for the increased incidence of this disease in the spring. This factor is difficult to dissociate from prolonged cold, since they occur more or less simultaneously.

The lack of correlation between meteorological conditions and admissions involving rheumatic fever and chorea is further suggested in table 7, which gives the number of admissions each year, mean annual temperature, and total annual precipitation. There is apparently no relation between the number of admissions each year for rheumatic fever and for Sydenham's chorea. Although the mean annual temperature of Philadelphia is quite constant from year to year, it is noteworthy that the greatest number of admissions occurred during 1931, the year with the highest mean temperature. Since the study was only of 5 years' duration, this observation can be regarded only as suggestive. It is consonant, however, with the views of Longstaff (*31*), Newsholme (*3*, *30*), and Maddox (*36*). It is also noteworthy that there was no increase in admissions during 1933, a year in which the total annual precipitation was considerably in excess of normal.

TABLE 7.—*Number of initial hospitals admissions involving rheumatic fever and chorea, mean temperature and inches of precipitation during each year in Philadelphia from January 1, 1930, to December 31, 1934*

Year	Number of admissions with rheumatic fever	Number of admissions with chorea	Mean annual temperature (degrees Fahrenheit)	Total annual precipitation (inches)
1930	230	149	56.7	34.0
1931	299	137	58.1	39.8
1932	268	130	57.1	44.5
1933	254	137	56.4	51.4
1934	254	119	55.0	38.4

SUMMARY

A review of the literature indicates that in Great Britain rheumatic fever and chorea occur with greatest frequency in the fall and during December and least often in the spring and early summer. The ex-

perience of most American writers suggests that in this country these conditions are most common during the late winter and spring months and least common during the late summer and fall.

In agreement with this consensus, this study indicates that in Philadelphia admissions involving rheumatic fever and chorea are most frequent in the spring and least frequent in the fall. The greatest number of admissions involving rheumatic fever was in April, the fewest in October. The peak of admissions involving chorea occurred in May; the smallest number in November.

Despite the fact that admissions involving rheumatic fever occurred with greatest frequency during the first 6 months of the year, especially the spring, and least often during the fall, considerable variations were noted from year to year. In a study of only 5 years' duration the greatest number of admissions occurred twice during April, twice during May, and once during June.

Seasonal variations of chorea were not as great as of rheumatic fever. The seasonal distribution of these conditions was only roughly comparable. There was apparently no relationship between the number of admissions for these diseases.

Admissions involving these conditions did not occur with greatest frequency during the coldest months or with least frequency during the warmest months. After allowing for the possibility that several weeks have elapsed between onset and admission to hospital, it is doubtful whether the onset of the greatest number of cases of rheumatic fever and chorea coincides with the coldest time of the year. These diseases are apparently no more common during years with low mean temperatures or following severely cold winters. Prolonged cold of winter, rather than severe cold or the onset of cold weather, seems more likely to be responsible for the increased frequency of rheumatic fever and chorea during the spring. It is difficult to dissociate the role of prolonged cold from lack of sunshine.

No relationship was indicated between the amount of precipitation and the number of admissions with rheumatic fever and Sydenham's chorea.

Although admissions with rheumatic heart disease are more common during the spring and least frequent during the fall, seasonal variations are not as great as for rheumatic fever and chorea.

Seasonal variations of deaths from rheumatic heart disease are not as great as admissions involving rheumatic fever, chorea, or rheumatic heart disease, but are somewhat greater than for deaths from all heart disease and deaths from all causes.

The seasonal distribution of admissions involving rheumatic conditions and deaths from rheumatic heart disease is dissimilar in many respects to the distribution of deaths from acute coronary occlusion.

In contradistinction to strictly rheumatic conditions, practically no

seasonal variations were noted in admissions or deaths from subacute bacterial endocarditis, regardless of its relationship to rheumatic heart disease.

REFERENCES

(*1*) Sydenham, Thomas: The entire works of Thomas Sydenham, newly made English from the originals by John Swan. E. Cave, London, 1742.
(*2*) Haygarth, John: A Clinical History of Diseases. I. A Clinical History of the Acute Rheumatism. London, 1805.
(*3*) Newsholme, Sir Arthur: The natural history and affinities of rheumatic fever. A study in epidemiology. Lancet, 1: 589 (1895).
(*4*) Gabbett, Henry S.: On the seasons of the year and the prevalence of acute rheumatism. Lancet, 2: 675 and 720 (1883).
(*5*) Medical Research Council, Great Britain. Child Life Investigations. Social conditions and acute rheumatism. (Special report series No. 114.) His Majesty's Stationery Office, London, 1927.
(*6*) Coombs, C. F.: The incidence of fatal rheumatic heart disease in Bristol, 1878 1913. Lancet, 2: 226 (1920).
(*7*) Campbell, Maurice, and Warner, E. C.: A study of rheumatic disease in Children. Lancet, 1: 61 (1930).
(*8*) Poynton, F. J., Paterson, Donald, and Spence, J. C.: Acute rheumatism in children under 12 years of age. Lancet, 2: 1086 (1920).
(*9*) Sturges, Octavius: On Chorea or St. Vitus Dance in Children. 2 ed. John Bale and Sons, London, 1893.
(*10*) Findlay, Leonard: The Rheumatic Infection in Childhood. Edward Arnold and Co., London, 1931.
(*11*) Lewis, Morris J.: A study of the seasonal relations of chorea and rheumatism for a period of 15 years— 1876 to 1889 inclusive. Trans. Assoc. Am. Phys., 7: 249 (1892).
(*12*) Starr, M. A.: Discussion of paper by Morris J. Lewis. Trans. Assoc. Am. Phys., 7: 262 (1892).
(*13*) Sutton, L. P.: Observations on certain etiological factors in rheumatism. Am. Heart J., 4: 145 (1928).
(*14*) Mills, C. A.: Medical Climatology. Charles C. Thomas, Springfield, Ill., 1939.
(*15*) Mills, C. A.: Seasonal and regional factors in acute rheumatic fever and rheumatic heart disease. J. Lab. and Clin. Med., 24: 53 (1938).
(*16*) Boas, E. P., and Schwartz, S. P.: Some modes of infection in rheumatic fever. Am. Heart J., 2: 375 (1926).
(*17*) Coburn, A. F.: The Factor of Infection in the Rheumatic State. Williams and Wilkins, Baltimore, 1931.
(*18*) McCulloch, Hugh, and Irvine-Jones, Edith M.: Role of infection in rheumatic children. Am. J. Dis. Child., 37: 252 (1929).
(*19*) Jones, T. D., and Bland, E. F.: Clinical significance of chorea as a manifestation of rheumatic fever. J. Am. Med. Assoc., 105: 571 (1935).
(*20*) Bilderback, J. B., and Overstreet, R. M.: Incidence of rheumatic infections in children in Oregon. Northwest. Med., 37: 390 (1938).
(*21*) Christie, Amos: Rheumatic fever in northern California. Am. Heart J., 12: 153 (1936).
(*22*) Kaiser, A. D.: Factors that influence rheumatic diseases in children. J. Am. Med. Assoc., 103: 886 (1934).
(*23*) Shapiro, M. J.: The natural history of childhood rheumatism in Minnesota. J. Lab. and Clin. Med., 21: 564 (1935).
(*24*) Juster, Irving R.: The significance of rheumatic activity in chronic rheumatic heart disease. Part II. A method of classification. Am. Heart J., 17: 669 (1939).
(*25*) Pounders, C. M., and Gray, James K.: Juvenile rheumatism. South. Med. J., 32: 471 (1939).
(*26*) Stroud, W. D., Goldsmith, M. A., Polk, D. S., and Thorpe, F. Q.: Ten years observation on children with rheumatic heart disease. J. Am. Med. Assoc., 101: 502 (1933).
(*27*) Rowlands, A. B.: The seasonal incidence of rheumatic fever in this country (Great Britain). Brit. Med. J., 2: 15 (1938).
(*28*) Young, M.: A preliminary study of the epidemiology of rheumatic fever. J. Hyg., 20: 248 (1921).

(29) Young, M.: Geographical distribution of heart disease in England and Wales and its relations to that of acute rheumatic fever and to some other factors. Lancet, 2: 590 (1925).
(30) Newsholme, Sir Arthur: The epidemiology of rheumatic fever. Practitioner, London, 66: 11 (1901).
(31) Longstaff, G. B.: A contribution to the etiology of rheumatic fever. Trans. Epidem. Soc. London., 24: 33 (1904-5).
(32) Greenwood, Major, and Thompson, Theodore: On meteorological factors in the etiology of acute rheumatism. J. Hyg., 7: 171 (1907).
(33) Wilson, May G., and Swift, Homer, F.: Intravenous vaccination with hemolytic streptococci: Its influence on the incidence and recurrence of rheumatic fever in children. Am. J. Dis. Child., 42: 42 (1931).
(34) Bean, William B., and Mills, C. A.: Coronary occlusion, heart failure and environmental temperatures. Am. Heart J., 16: 701 (1938).
(35) Hedley, O. F.: An analysis of 5,116 deaths reported as due to acute coronary occlusion in Philadelphia, 1933-1937. Pub. Health Rep., 54: 972 (1939).
(36) Maddox, Kenneth: Metropolitan and rural incidence and distribution of acute rheumatism and rheumatic heart disease in New South Wales. Part III. Distribution of rheumatic fever in the metropolis of Sydney. Australia Med. J., 1: 464 (1937).

JOURNAL OF THE NATIONAL CANCER INSTITUTE

The first issue (August) of the Journal of the National Cancer Institute is off the press. This is a new publication of the Public Health Service, to be issued bi-monthly, the purpose of which as set forth in the foreword by Surgeon General Parran, is "to carry out most efficiently the provisions of the act of Congress of August 5, 1937, creating the National Cancer Institute." Among other things, this act authorizes and directs the Institute "to conduct, assist, and foster researches, investigations, experiments, and studies relating to the cause, prevention, and methods of diagnosis and treatment of cancer," and "to make available such information through appropriate publications for the benefit of health agencies and organizations (public or private), physicians or any other scientists and for the information of the general public."

As none of the present publications of the Public Health Service is suited for the current publication of this type of material, and in view of the increasing amount of cancer research and the growing importance of cancer in the field of public health, a journal devoted exclusively to this special research activity has become necessary. The policy of the new Journal will be, therefore, to contribute to the dissemination of knowledge and to encourage research in the subject of cancer.

The first two articles in the first issue of the Journal, by Doctors Voegtlin and Spencer, Chief and Assistant Chief, respectively, of the National Cancer Institute, present the Federal cancer control program and outline the approaches to cancer research. The other 10 articles present reports on various basic laboratory investigations.

The complexity of the studies through which it is hoped eventually to solve the cancer problem, especially the etiology, methods of prevention, and improved methods of treatment, is indicated by the fact that the cancer process has a much wider biological significance than that of most other diseases. This is shown by the interesting array of certain facts which have been fully confirmed and which are summarized in the first article as follows:

1. It has been found in nearly all mammals, and yet cancer arising in one species can be transferred to an individual of another species only with extreme difficulty and under highly artificial conditions. Even in individuals of the same species, a transplanted cancer will seldom grow and develop. However, when animals are inbred by brother-and-sister mating for many generations and thus the genetic constitution of the individuals becomes identical (homozygous), like true twins, then cancers arising in such a group of animals are readily transplantable among these genetically "pure" lines.

One sees, therefore, that while cancer occurs among so many different species, any given cancer is, paradoxically, not only species specific, but practically individually specific.

2. Factors contributing to the causation of this abnormal process of cell growth that we call cancer are now known to be multiple; hence the cancer process cannot be compared to the infectious disease process that has a single known causative agent. Human cancer is definitely not communicable.

3. Both clinical and experimental evidence point to the fact that chronic irritation plays a part in the causation of cancer.

4. Numerous chemical substances (various coal-tar products) and many physical agents (heat, light, radium, and X-rays) have been repeatedly proved to initiate the cancer process in experimental animals. Exactly how these agents act upon the tissue cells, however, is still unknown.

5. Once the process has started, the cancer-producing agents are no longer necessary to the growth and spread of the cancer again a striking contrast to the usual infectious process.

6. Cancer cells are known to be permanently altered. They have been kept growing for more than 12 years outside the animal body (tissue-culture technique) and yet still retain the power to produce a cancer when transplanted into the same strain of animal from which the cancer cells were originally obtained.

7. The hormones or internal secretions of the body also play a part in the cancer process. The ovarian hormone, estrone, will invariably induce cancer of the breast in the females of certain strains of mice.

8. While differences in nuclear structure and chromatin content are demonstrable, as a rule, between normal and cancer cells, no specific differences have been observed in chemical composition, enzyme content, or metabolism.

The Journal is royal octavo size, $6^{11}/_{16}$ by $9\frac{3}{4}$ inches, trimmed, printed in Baskerville type (10, 8, and 6 point), leaded, on single-coated book paper. The type page, which consists of two columns, is $31\frac{1}{2}$ by 48 picas. The magazine is side stitched and carries a gold antique cover. The first issue contains 128 pages of text. It is printed at the Government Printing Office, and is for sale by the Superintendent of Documents. The annual subscription rate in the United States, Canada, and Mexico is \$2.00; the price per single copy is 40 cents.

CALIFORNIA DEPARTMENT OF AGRICULTURE AIDS IN PLAGUE-SUPPRESSIVE MEASURES

According to Mr. W. C. Jacobsen, Chief of the Bureau of Rodent Plague and Weed Control, of the California State Department of Agriculture, that Department has voluntarily cooperated with the health officials of the State since 1929 in the suppression of rodents in areas where they are reported to harbor diseases transmissible to human beings. In 1939, the following amendment to the Agricultural Code was approved by the Governor of California which specifically authorizes this cooperation:

CHAPTER 263

An act to amend section 139.5 of the Agricultural Code, relating to the suppression of field rodents

(Approved by Governor May 26, 1939. Filed with Secretary of State May 27, 1939)

The people of the State of California do enact as follows:

Section 1. Section 139.5 of the Agricultural Code is hereby amended to read as follows:

139.5. Whenever the director shall receive a report from the executive officer of the State Department of Public Health advising that in a certain area or in certain areas there have been found field rodents in which diseases transmissible and injurious to humans are reservoired, or that in such areas insects or other vectors which carry diseases transmissible and injurious to humans are harbored on such rodents, he shall forthwith advise the commissioner in the county concerned, whose duty it shall be to cooperate in suppressing such rodents, and the director shall cooperate in accordance with the provisions of section 34 for the purpose of suppressing such rodents on the reported areas and on neighboring areas, to prevent the spread thereof.

In order to carry out the purposes of this section, the director or commissioner is empowered to enter upon any and all premises within any such area to bait, trap, expose chemically treated baits, or perform any act which he may deem necessary for the purpose of suppressing, destroying, or repelling such rodents.

TOXICITY AND POTENTIAL DANGERS OF ALIPHATIC AND AROMATIC HYDROCARBONS [1]

A Critical Review of the Literature

The increasing use of aliphatic and aromatic hydrocarbons in different industries has created hazards, the appraisal of which offers many difficulties. In order to permit evaluation of such hazards the different hydrocarbons of the paraffin, olefine, diolefine, acetylene, saturated and unsaturated cyclo paraffin and aromatic series, and

[1] Public Health Bulletin No. 255. Toxicity and potential dangers of aliphatic and aromatic hydrocarbons. A critical review of the literature. By W. F. von Oettingen. Government Printing Office, Washington, 1940. Available from the Superintendent of Documents, Washington, D. C., at 20 cents per copy.

certain mixtures, such as coal oil and benzine are discussed in a recent Public Health Bulletin, in regard to the relation between their toxicologic action and their physical and chemical properties.

The appraisal of the toxicity and potential dangers of many petroleum distillates is rendered difficult because these usually represent mixtures of hydrocarbons belonging to different groups. It is shown that for the proper evaluation of hazards the knowledge of the physico-chemical properties of such mixtures alone is not sufficient but that it is essential that their fractional composition in respect to the various groups is also known. It is shown that knowledge of boiling point and specific gravity of such fractions and the percentile fractional composition of the solvent in question would probably allow a fair appraisal of their toxicity and potential dangers, without going into detailed time-consuming and, therefore, expensive toxicological experiments. Such procedure appears especially desirable because the chemical composition of different commercial brands of such solvents will not necessarily be constant although the physico-chemical properties, such as boiling point and specific gravity, may be unchanged.

COURT DECISION ON PUBLIC HEALTH

Filled milk act held valid.— (Kansas Supreme Court; *Carolene Products Co.* v. *Mohler, Secretary of Agriculture, et al.*, 102 P.2d 1044; decided June 8, 1940.) The so-called filled milk statute of Kansas made it unlawful "to manufacture, sell, keep for sale, or have in possession with intent to sell or exchange, any milk, cream, skim milk, buttermilk, condensed or evaporated milk, powdered milk, condensed skim milk, or any of the fluid derivatives of any of them to which has been added any fat or oil other than milk fat, either under the name of said products, or articles or the derivatives thereof, or under any fictitious or trade name whatsoever." This law was challenged as being unconstitutional by a company selling a product found by the trial court to be made by adding pure, refined coconut oil and certain vitamin concentrates to fresh, sweet skimmed milk and then reducing the mixture by evaporation until it consisted of 20 percent milk solids other than fats, thoroughly sterilized and free from bacteria. The plaintiff's action sought to enjoin the State secretary of agriculture and State dairy commissioner from enforcing the said statute. The defendants contended that the statute was enacted by the legislature in the lawful exercise of the police power, that it was not unreasonable or arbitrary, and that it did not deprive the plaintiff of its property without due process of law. The lower court held the act constitutional and, on appeal by the plaintiff, the supreme court affirmed the judgment of the court below.

One of the trial court's findings of fact was that there was a serious disagreement among experts on nutrition as to whether coconut oil was a pure, healthful, and nutritious food and that the weight of the evidence did not show that coconut oil was a pure, nutritious, and healthful food and not harmful when used as food. The supreme court stated that it was clear that the statute had a two-fold purpose—(1) preservation of the public health and (2) prevention of fraud and deception on consumers—and further stated that, if on the evidence there was room for a reasonable difference of opinion as to whether the products outlawed by the statute were attended with evil consequences to the public, either in the health of the people or through fraud and deception in the purchase and use of the products, the legislature's judgment as expressed in the statute could not be superseded by the court's views. The position was taken that, even if the added ingredient was harmless in itself, the legislature could still prohibit the manufacture and sale of the compound to prevent fraud and deception.

DEATHS DURING WEEK ENDED SEPTEMBER 21, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 21, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,669	7,614
Average for 3 prior years	7,592	
Total deaths, first 38 weeks of year	322,202	316,308
Deaths under 1 year of age	520	482
Average for 3 prior years	500	
Deaths under 1 year of age, first 38 weeks of year	19,056	19,092
Data from industrial insurance companies:		
Policies in force	64,843,013	66,671,692
Number of death claims	11,227	10,591
Death claims per 1,000 policies in force, annual rate	9.1	8.3
Death claims per 1,000 policies, first 38 weeks of year, annual rate	9.8	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 28, 1940

Summary

The number of reported cases of poliomyelitis dropped from 796 for the preceding week to 711 for the current week, which is still considerably above the 5-year (1935–39) median of 469 (reported in 1939). The highest number of cases reported for the corresponding week in the 5-year period was 603, in 1937, and the lowest number 52, in 1938.

With two successive decreases in the number of cases reported, it appears that the peak of poliomyelitis incidence this year has been reached and that it occurred during the week ended September 14, or the week of September 15–21.

During the current week, slight increases are shown in the New England, Middle Atlantic, and West South Central States, while the other six geographic areas registered decreases. Substantial decreases are recorded for the North Central groups of States (from 565 to 481), which have been reporting the highest incidence. In the Pacific States, Washington reported 15 cases (20 last week), Oregon none (8 last week), and California 13 (9 last week). During this year, to date, 6,363 cases of poliomyelitis have been reported in the United States, as compared with a 5-year median of 4,908.

The incidence of each of the other 8 important communicable diseases included in the weekly table was below the respective 5-year median.

Five cases of Rocky Mountain spotted fever were reported, all in eastern States, 7 cases of encephalitis (4 in Colorado), and 63 cases of endemic typhus fever (22 in Texas and 20 in Georgia).

For the current week, the Bureau of the Census reported 7,489 deaths in 88 major cities of the United States, as compared with 7,669 for the preceding week, and with a 3-year (1937–39) average of 7,803 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended September 28, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 28, 1940	Sept. 30, 1939		Sept. 28, 1940	Sept. 30, 1939		Sept. 28, 1940	Sept. 30, 1939		Sept. 28, 1940	Sept. 30, 1939	
NEW ENG.												
Maine	1	3	1	2	1	1	1	4	4	1	0	0
New Hampshire	0	0	0	------	------	------	0	0	0	0	0	0
Vermont	0	0	0	------	------	------	2	5	6	0	0	0
Massachusetts	2	6	6	------	------	------	64	25	25	1	0	1
Rhode Island	0	1	0	------	------	------	0	15	2	1	0	0
Connecticut	0	2	2	1	------	2	2	10	5	0	0	0
MID. ATL.												
New York	14	10	23	[1] 8	[1] 6	[1] 11	51	28	60	4	1	6
New Jersey	3	4	6	1	5	7	49	10	16	0	0	0
Pennsylvania [2]	10	16	19	------	------	------	82	23	03	4	1	3
E. NO. CEN.												
Ohio	6	27	32	0	14	14	8	11	20	0	1	2
Indiana	8	9	28	4	1	14	5	4	3	0	0	1
Illinois	11	13	26	3	6	9	32	7	14	1	1	3
Michigan [3]	4	5	13	5	8	2	55	14	15	1	1	1
Wisconsin	2	0	0	33	48	28	70	18	28	0	0	1
W. NO. CEN.												
Minnesota	1	4	4	------	3	1	4	6	7	0	0	0
Iowa [2]	2	11	11	------	------	------	2	5	3	1	0	0
Missouri	3	4	25	1	------	22	3	4	4	0	0	1
North Dakota	3	3	2	------	14	5	4	1	2	0	0	0
South Dakota	1	1	1	1	------	------	0	3	2	0	0	0
Nebraska	1	4	4	------	------	------	19	0	2	1	0	0
Kansas	6	4	6	2	4	1	5	7	5	1	1	0
SO. ATL.												
Delaware	0	0	0	------	------	------	2	1	1	0	0	0
Maryland [3]	3	6	9	------	4	3	1	3	6	2	0	3
Dist. of Col	2	1	4	------	2	1	2	1	3	0	0	0
Virginia	10	62	39	40	32	------	16	4	5	0	4	2
West Virginia [3]	2	9	21	7	8	8	2	2	5	1	3	1
North Carolina [2]	46	115	105	2	2	2	11	11	11	0	0	0
South Carolina [4]	8	41	24	147	160	160	0	1	1	0	1	0
Georgia [4]	18	38	38	11	5	------	11	1	0	0	0	0
Florida [4]	5	12	10	8	4	2	1	2	2	1	1	0
E. SO. CEN.												
Kentucky	14	24	24	2	4	3	33	17	12	0	2	4
Tennessee [2]	10	20	39	5	30	30	5	4	4	2	1	1
Alabama [4]	16	39	44	2	7	9	16	0	6	1	0	2
Mississippi [4]	10	19	22	------	------	------	------	------	------	0	0	0
W. SO. CEN.												
Arkansas	12	21	20	16	2	5	1	9	1	0	0	0
Louisiana [4]	2	13	14	------	2	3	2	0	1	2	2	1
Oklahoma	9	6	7	11	12	27	1	0	1	0	0	1
Texas [4]	34	21	40	71	67	67	6	60	13	2	2	0
MOUNTAIN												
Montana	0	0	0	------	------	4	16	8	8	0	0	0
Idaho	0	0	0	------	------	2	1	3	0	0	0	0
Wyoming	0	4	1	------	------	------	0	3	6	0	0	0
Colorado	4	5	10	------	13	------	6	8	7	0	0	0
New Mexico	3	3	3	------	1	1	1	0	3	0	2	0
Arizona	0	2	2	43	46	18	11	1	3	0	0	0
Utah [2]	0	0	0	2	2	------	5	2	2	0	0	0
PACIFIC												
Washington	4	3	2	------	------	------	6	142	9	0	0	0
Oregon	3	3	1	15	7	11	7	14	8	0	0	0
California	14	9	22	19	5	16	47	72	72	1	0	1
Total	307	609	784	468	525	534	668	584	672	28	24	52
39 weeks	10,348	14,808	17,773	172,013	154,152	143,202	232,468	351,182	351,182	1,275	1,525	4,499

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended September 28, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis: Week ended Sept. 28, 1940	Poliomyelitis: Week ended Sept. 30, 1939	Poliomyelitis: Median, 1935–39	Scarlet fever: Week ended Sept. 28, 1940	Scarlet fever: Week ended Sept. 30, 1939	Scarlet fever: Median, 1935–39	Smallpox: Week ended Sept. 28, 1940	Smallpox: Week ended Sept. 30, 1939	Smallpox: Median, 1935–39	Typhoid and paratyphoid fever: Week ended Sept. 28, 1940	Typhoid and paratyphoid fever: Week ended Sept. 30, 1939	Typhoid and paratyphoid fever: Median, 1935–39
NEW ENG.												
Maine	1	0	6	0	3	4	0	0	0	0	0	2
New Hampshire	0	0	0	1	0	3	0	0	0	0	0	0
Vermont	0	7	2	4	8	6	0	0	0	0	0	0
Massachusetts	7	4	4	28	33	50	0	0	0	0	0	3
Rhode Island	0	1	0	3	1	8	0	0	0	0	0	0
Connecticut	1	2	5	17	22	13	0	0	0	0	3	2
MID. ATL.												
New York	21	109	45	92	54	128	0	0	0	16	18	26
New Jersey	3	17	12	38	45	35	0	0	0	5	10	11
Pennsylvania [2]	13	36	15	95	150	149	0	0	0	20	19	22
E. NO. CEN.												
Ohio	46	5	7	93	106	152	0	0	0	12	24	30
Indiana	44	4	4	22	68	85	0	0	0	7	11	11
Illinois	65	13	14	104	85	138	2	0	1	21	58	29
Michigan [3]	72	58	80	62	86	88	1	0	0	5	2	11
Wisconsin	40	8	4	61	68	76	0	0	0	1	7	2
W. NO. CEN.												
Minnesota	25	84	3	38	37	37	1	0	0	4	2	4
Iowa [2]	101	16	7	18	37	37	0	1	2	6	3	3
Missouri	28	2	2	16	25	59	0	0	0	14	13	13
North Dakota	0	1	0	10	20	12	3	1	3	0	3	1
South Dakota	8	0	1	11	8	8	0	1	0	0	2	2
Nebraska	7	1	1	3	12	13	0	1	0	1	1	0
Kansas	45	4	4	28	56	56	0	1	1	5	4	5
SO. ATL.												
Delaware	0	0	0	2	3	3	0	0	0	1	0	1
Maryland [1]	1	2	5	17	25	25	0	0	0	8	6	14
District of Columbia	1	2	2	11	6	6	0	0	0	1	1	2
Virginia	24	3	3	18	36	34	0	0	0	15	23	20
West Virginia [3]	64	0	1	20	35	48	0	7	0	19	15	15
North Carolina [2]	2	4	2	81	64	66	0	0	0	6	10	22
South Carolina [4]	0	5	1	6	9	9	0	0	0	8	14	14
Georgia [4]	0	1	1	27	18	23	0	0	0	17	14	14
Florida [4]	2	0	0	2	4	4	0	0	0	4	5	4
E. SO. CEN.												
Kentucky	13	7	2	35	52	57	0	0	0	15	24	25
Tennessee [2]	4	0	3	60	44	44	0	0	0	14	10	11
Alabama [4]	0	0	1	26	32	23	0	1	1	17	3	6
Mississippi [4]	1	1	1	14	10	13	0	0	0	3	5	7
W. SO. CEN.												
Arkansas	1	2	2	11	14	14	0	0	0	18	16	13
Louisiana [4]	12	0	1	10	5	5	0	0	0	25	16	22
Oklahoma	8	3	2	18	13	13	0	0	0	12	11	12
Texas [4]	3	16	2	20	24	31	0	1	1	48	40	34
MOUNTAIN												
Montana	6	0	0	20	9	21	0	0	0	0	0	3
Idaho	6	2	0	10	1	9	0	0	0	5	1	4
Wyoming	6	1	0	1	4	4	0	0	0	2	0	0
Colorado	0	13	9	11	19	19	0	2	2	1	4	10
New Mexico	2	10	0	0	1	6	1	0	0	6	1	20
Arizona	0	2	0	2	2	3	0	0	0	1	5	0
Utah [2]	0	13	0	4	8	8	0	0	0	1	0	0
PACIFIC												
Washington	15	0	0	18	31	19	0	0	2	2	15	4
Oregon	0	3	3	10	9	15	0	1	1	8	6	4
California	13	57	26	72	85	110	1	2	1	9	3	13
Total	711	469	469	1,270	1,487	1,871	9	19	33	383	428	572
39 weeks	6,363	4,908	4,908	124,176	122,665	172,584	2,020	8,813	8,284	7,441	10,090	11,272

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 28, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued.

Division and State	Whooping cough, week ended Sept. 28, 1940	Whooping cough, week ended Sept. 30, 1939
NEW ENG.		
Maine	6	27
New Hampshire	0	0
Vermont	9	27
Massachusetts	104	64
Rhode Island	2	24
Connecticut	49	55
MID. ATL.		
New York	224	274
New Jersey	118	82
Pennsylvania [2]	353	311
E. NO. CEN.		
Ohio	160	184
Indiana	21	68
Illinois	111	157
Michigan [3]	243	84
Wisconsin	110	124
W. NO. CEN.		
Minnesota	38	69
Iowa [2]	3	12
Missouri	25	23
North Dakota	26	10
South Dakota	2	3
Nebraska	4	1
Kansas	41	16
SO. ATL.		
Delaware	15	8
Maryland [3]	65	53
District of Columbia	2	17
Virginia	48	16
West Virginia [3]	37	7
North Carolina [2]	99	82
South Carolina [4]	18	13
SO. ATL.—con.		
Georgia [4]	10	20
Florida [4]	5	0
E. SO. CEN.		
Kentucky	79	52
Tennessee [2]	37	17
Alabama [4]	27	55
Mississippi [4]		
W. SO. CEN.		
Arkansas	6	0
Louisiana [4]	3	23
Oklahoma	14	5
Texas [4]	117	44
MOUNTAIN		
Montana	3	7
Idaho	2	0
Wyoming	1	2
Colorado	13	23
New Mexico	18	40
Arizona	12	23
Utah [3]	20	41
PACIFIC		
Washington	36	24
Oregon	6	32
California	269	109
Total	2,611	2,328
39 weeks	122,903	141,753

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Sept. 28, 1940, 5 cases as follows: Pennsylvania, 1; Iowa, 1; North Carolina, 1; Tennessee, 2.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Sept. 28, 1940, 63 cases as follows: South Carolina, 4; Georgia, 20; Florida, 3; Alabama, 8; Mississippi, 3; Louisiana, 3; Texas, 22.

WEEKLY REPORTS FROM CITIES

City reports for week ended September 14, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	105	40	13	133	294	325	2	324	75	1,064	--------
Current week	40	27	6	154	284	260	0	307	46	1,072	--------
Maine:											
Portland	0	------	0	0	2	1	0	0	0	4	18
New Hampshire:											
Concord	0	------	0	0	0	1	0	0	0	0	9
Manchester	0	------	0	0	0	2	0	0	0	0	12
Nashua	0	------	0	0	0	1	0	1	0	0	6
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	1
Burlington	0	------	0	0	0	1	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	0	------	0	11	9	6	0	8	0	50	197
Fall River	0	------	0	1	1	0	0	0	0	3	28
Springfield	0	------	0	0	0	3	0	0	0	0	34
Worcester	0	------	0	6	3	2	0	2	0	10	43
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	12
Providence	0	------	0	0	2	1	0	2	0	1	53
Connecticut:											
Bridgeport	0	------	0	0	0	4	0	1	0	0	26
Hartford	0	1	1	1	2	0	0	0	0	2	37
New Haven	0	2	0	0	0	0	0	0	0	12	41
New York:											
Buffalo	0	------	0	2	11	4	0	5	0	6	98
New York	8	5	2	42	48	30	0	67	7	129	1,256
Rochester	0	------	0	1	4	0	0	0	0	12	73
Syracuse	0	------	0	0	1	1	0	0	1	8	37
New Jersey:											
Camden	0	------	0	2	0	1	0	0	0	1	30
Newark	0	------	0	7	1	8	0	5	0	49	70
Trenton	0	------	0	0	4	2	0	2	0	2	24
Pennsylvania:											
Philadelphia	1	1	0	4	5	6	0	21	2	66	377
Pittsburgh	0	------	0	2	9	5	0	7	1	44	125
Reading	0	------	0	3	1	0	0	1	0	13	20
Scranton	0	------	--------	0	------	0	0	------	0	0	--------
Ohio:											
Cincinnati	0	------	0	1	4	4	0	7	1	12	140
Cleveland	1	7	1	2	7	10	0	3	0	63	150
Columbus	1	------	0	0	2	0	0	2	0	6	74
Toledo	0	------	0	2	1	5	0	3	0	8	75
Indiana:											
Anderson	0	------	0	0	1	0	0	0	0	0	9
Fort Wayne	0	------	0	0	1	0	0	0	0	0	23
Indianapolis	1	------	0	3	6	3	0	5	1	24	87
Muncie	0	------	0	0	0	0	0	0	0	1	5
South Bend	0	------	0	0	0	0	0	0	0	0	13
Terre Haute	0	------	0	0	0	0	0	0	0	0	18
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	9
Chicago	4	1	0	9	18	51	0	34	4	74	570
Elgin	0	------	0	0	0	2	0	0	0	0	11
Moline	0	------	0	0	0	1	0	0	0	0	9
Springfield	0	------	0	0	2	2	0	1	0	2	19
Michigan:											
Detroit	1	------	0	29	10	26	0	14	1	111	235
Flint	0	------	0	1	3	2	0	0	0	2	15
Grand Rapids	0	------	0	2	1	3	0	0	0	37	26
Wisconsin:											
Kenosha	0	------	0	2	0	0	0	0	0	0	11
Madison	0	------	0	2	0	0	0	0	0	0	13
Milwaukee	0	------	0	10	2	10	0	2	0	7	79
Racine	0	------	0	0	0	5	0	1	0	0	13
Superior	0	------	0	0	0	0	0	0	0	1	12
Minnesota:											
Duluth	0	------	0	0	0	1	0	1	1	3	26
Minneapolis	1	------	0	1	2	6	0	1	2	25	94
St. Paul	0	------	0	0	4	4	0	0	0	12	56

City reports for week ended September 14, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	-	-	0	-	1	0	-	0	2	-
Davenport	0	-	-	1	-	2	0	-	0	0	-
Des Moines	1	-	0	1	0	2	0	0	0	0	28
Sioux City	0	-	-	1	-	0	0	-	0	0	-
Waterloo	0	-	-	1	-	0	0	-	0	1	-
Missouri:											
Kansas City	0	-	0	0	3	1	0	1	1	13	83
St. Joseph	0	-	0	0	4	0	0	0	0	0	28
St. Louis	1	-	0	1	11	9	0	5	0	19	190
North Dakota:											
Fargo	0	-	0	0	1	0	0	0	0	1	9
Grand Forks	0	-	-	0	-	0	0	-	0	0	-
Minot	0	-	0	0	0	0	0	0	0	0	4
South Dakota:											
Aberdeen	0	-	-	0	-	0	0	-	0	3	-
Sioux Falls	0	-	-	0	-	2	0	-	0	0	-
Nebraska:											
Lincoln	0	-	-	0	-	0	0	-	0	3	-
Omaha	0	-	0	1	2	0	0	1	0	0	66
Kansas:											
Lawrence	0	-	0	0	0	0	0	0	0	0	3
Topeka	1	-	0	0	0	2	0	0	0	0	11
Wichita	0	-	0	1	1	0	0	1	0	7	18
Delaware:											
Wilmington	0	-	0	0	0	2	0	0	0	10	26
Maryland:											
Baltimore	0	-	0	2	7	5	0	9	3	64	185
Cumberland	0	-	1	1	0	0	0	1	0	0	12
Frederick	0	-	0	0	0	0	0	0	0	0	3
Dist. of Col.:											
Washington	2	-	0	0	7	3	0	6	1	4	124
Virginia:											
Lynchburg	1	-	0	0	0	1	0	0	0	0	7
Norfolk	0	2	0	0	3	3	0	0	1	2	29
Richmond	1	-	0	0	0	1	0	0	2	1	35
Roanoke	0	-	0	0	1	0	0	0	0	6	13
West Virginia:											
Charleston	0	-	0	0	1	0	0	0	0	0	18
Huntington	0	-	-	0	-	0	0	-	1	0	-
Wheeling	0	-	0	0	1	1	0	0	0	0	16
North Carolina:											
Gastonia	0	-	0	0	0	0	0	0	0	0	-
Raleigh	0	-	0	0	3	0	0	2	0	2	19
Wilmington	1	-	0	0	0	0	0	0	0	0	13
Winston-Salem	0	-	0	0	1	0	0	0	0	9	12
South Carolina:											
Charleston	1	-	0	0	3	0	0	4	0	0	26
Florence	0	8	0	0	0	0	0	0	0	0	7
Greenville	1	-	0	0	1	1	0	0	0	1	22
Georgia:											
Atlanta	0	-	0	1	2	2	0	4	0	1	52
Brunswick	0	-	0	0	0	0	0	0	0	0	1
Savannah	1	-	0	0	0	0	0	1	0	0	17
Florida:											
Miami	0	1	1	0	0	0	0	1	2	1	23
Tampa	0	-	0	0	0	0	0	0	0	0	12
Kentucky:											
Ashland	0	-	0	0	1	0	0	1	1	0	9
Covington	0	-	0	0	1	0	0	1	0	0	13
Lexington	0	-	0	2	0	0	0	0	0	1	7
Louisville	0	-	0	0	0	4	0	2	0	19	72
Tennessee:											
Knoxville	0	-	-	0	-	0	0	-	2	1	-
Memphis	0	-	0	0	0	6	0	2	2	15	78
Nashville	0	-	0	0	1	1	0	2	3	3	31
Alabama:											
Birmingham	0	-	0	1	1	2	0	5	1	0	69
Mobile	0	2	0	0	3	1	0	2	1	1	24
Montgomery	0	-	-	0	-	1	0	-	1	1	-
Arkansas:											
Fort Smith	0	-	-	0	-	0	0	-	0	0	-
Little Rock	0	-	0	0	3	0	0	2	0	1	-
Louisiana:											
New Orleans	5	1	0	0	6	1	0	9	1	5	109
Shreveport	0	-	0	0	5	0	0	2	4	0	41
Oklahoma:											
Oklahoma City	1	-	0	0	0	1	0	0	0	0	32
Tulsa	0	-	0	0	1	0	0	0	1	10	17

City reports for week ended September 14, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Texas:											
Dallas	1	1	1	0	1	1	0	2	1	5	49
Fort Worth	1	------	0	6	1	0	0	1	1	16	40
Galveston	0	------	0	0	1	0	0	1	1	0	13
Houston	3	------	0	0	2	0	0	10	0	0	80
San Antonio	0	------	0	0	3	2	0	6	1	4	60
Montana:											
Billings	0	------	0	0	2	0	0	0	0	1	7
Great Falls	0	------	0	0	1	0	0	0	0	0	7
Helena	0	------	0	0	0	0	0	0	0	0	4
Missoula	0	------	0	0	0	0	0	0	0	0	8
Idaho:											
Boise	0	------	0	0	0	0	0	0	0	0	6
Colorado:											
Colorado Springs	0	------	0	1	0	0	0	2	0	0	9
Denver	0	------	0	1	4	1	0	3	0	6	66
Pueblo	0	------	0	0	1	0	0	1	0	0	10
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	5
Utah:											
Salt Lake City	0	------	0	1	2	2	0	0	0	10	27
Washington:											
Seattle	0	------	0	0	3	0	0	3	0	4	86
Spokane	0	------	0	0	2	3	0	0	0	1	31
Tacoma	0	------	0	0	2	2	0	0	0	1	33
Oregon:											
Portland	0	1	0	2	0	1	0	0	0	4	58
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	4	6	0	2	3	6	0	16	2	57	314
Sacramento	0	------	0	0	1	0	0	5	0	0	37
San Francisco	0	------	0	0	4	3	0	9	1	27	165

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Fall River	0	0	1
Worcester	0	0	1
Rhode Island:			
Providence	0	0	1
Connecticut:			
Bridgeport	0	0	1
New York:			
Buffalo	1	0	0
New York	7	1	4
Pennsylvania:			
Philadelphia	0	0	0
Pittsburgh	1	0	0
Ohio:			
Cincinnati	0	0	7
Cleveland	0	0	2
Columbus	0	0	3
Toledo	0	0	2
Indiana:			
Fort Wayne	0	0	1
Muncie	0	0	3
South Bend	0	0	2
Illinois:			
Chicago	2	3	21
Michigan:			
Detroit	0	0	12
Grand Rapids	0	0	10
Wisconsin:			
Madison	0	0	7
Milwaukee	0	0	1
Minnesota:			
Duluth	0	0	1
Iowa:			
Cedar Rapids	0	0	1
Des Moines	0	0	4
Sioux City	0	0	1
Waterloo	0	0	4
Missouri:			
Kansas City	0	0	12
St. Joseph	0	0	1

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
South Dakota:			
Sioux Falls	0	0	5
Nebraska:			
Omaha	0	0	5
Kansas:			
Topeka	0	0	2
Maryland:			
Cumberland	1	0	0
Virginia:			
Norfolk	0	0	1
Richmond	0	0	2
Roanoke	0	0	1
West Virginia:			
Huntington	0	0	2
Florida:			
Miami	0	0	1
Kentucky:			
Covington	0	0	1
Louisville	0	0	1
Tennessee:			
Knoxville	0	0	1
Louisiana:			
New Orleans	0	0	3
Shreveport	0	0	3
Texas:			
Dallas	0	0	1
Houston	1	0	0
Colorado:			
Colorado Springs	0	0	1
New Mexico:			
Albuquerque	0	0	1
Washington:			
Seattle	0	0	7
Tacoma	0	0	1
California:			
Los Angeles	0	0	2
San Francisco	0	0	2

Encephalitis, epidemic or lethargic.—Cases: Springfield, Mass., 1.
Pellagra.—Cases: Florence, 1; Savannah, 1; San Francisco, 1.
Typhus fever.—Cases: New York, 1; Savannah, 2; Birmingham, 1; Mobile, 1; New Orleans, 1; Dallas, 4.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 17, 1940.—During the week ended August 17, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	2				1	4
Chickenpox		2			77	20	10	6	6	121
Diphtheria			2	12	1	3		2		20
Dysentery					6					6
Influenza					18	1			3	22
Lethargic encephalitis									1	1
Measles	2		3	12	89	11	19	16	9	161
Mumps				2	59	6	2		6	75
Pneumonia	3				15	1			3	22
Poliomyelitis				5	4	2	1			12
Scarlet fever		3		40	33	1	1	3		81
Trachoma									1	1
Tuberculosis	6		10	60	34	3				113
Typhoid and paratyphoid fever			2	11	4					17
Whooping cough			3	202	61	7	7	9	12	301

CUBA

Habana—Communicable diseases—4 weeks ended August 24, 1940.—During the 4 weeks ended August 24, 1940, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths
Diphtheria	4	1
Malaria	2	
Typhoid fever	52	6

DENMARK

Notifiable diseases—April–June 1940.—During the months of April, May, and June 1940, cases of certain notifiable diseases were reported in Denmark, as follows:

Disease	April	May	June	Disease	April	May	June
Cerebrospinal meningitis	5	6	6	Mumps	143	191	82
Chickenpox	698	855	584	Paratyphoid fever	1	4	2
Diphtheria	55	66	80	Poliomyelitis	1		3
Dysentery	51	17	12	Puerperal fever	21	30	10
Epidemic encephalitis	4	2	2	Scarlet fever	541	514	449
Erysipelas	228	242	173	Syphilis	44	38	31
Gastroenteritis, infectious	1,807	1,948	2,168	Tetanus, neonatorum	2	3	3
German measles	1,525	1,735	894	Typhoid fever	3		1
Gonorrhea	541	565	576	Undulant fever	42	57	47
Influenza	16,549	13,337	3,727	Weil's disease	1	1	1
Malaria	3	1		Whooping cough	1,335	1,458	1,466
Measles	2,803	4,765	3,874				

FINLAND

Communicable diseases—4 weeks ended June 15, 1940.—During the 4 weeks ended June 15, 1940, cases of certain communicable diseases were reported in Finland, as follows:

Disease	Cases	Disease	Cases
Diphtheria	291	Poliomyelitis	21
Dysentery	1	Scarlet fever	939
Influenza	2,601	Typhoid fever	24
Paratyphoid fever	115	Undulant fever	1

JAMAICA

Notifiable diseases—4 weeks ended August 31, 1940.—During the 4 weeks ended August 31, 1940, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	12	15	Leprosy		3
Diphtheria	5	3	Puerperal sepsis		1
Dysentery	17	9	Tuberculosis	51	82
Erysipelas	1		Typhoid fever	29	70

SWEDEN

Notifiable diseases—July 1940.—During the month of July 1940, cases of certain notifiable diseases were reported in Sweden, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Poliomyelitis	31
Diphtheria	40	Scarlet fever	1,306
Dysentery	25	Syphilis	38
Epidemic encephalitis	4	Typhoid fever	3
Gonorrhea	973	Undulant fever	16
Paratyphoid fever	78	Weil's disease	2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of September 27, 1940, pages 1796-1799. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Hong Kong.—During the week ended September 14, 1940, 413 cases of cholera were reported in Hong Kong, China.

Plague

Ecuador—El Oro Province—Huaquillas.—A report dated August 29, 1940, states that since August 15, 1940, 6 cases of plague have been reported in the town of Huaquillas near the Peruvian border in the Province of El Oro, Ecuador.

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Public Health Reports

VOLUME 55 **OCTOBER 11, 1940** NUMBER 41

IN THIS ISSUE

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

Vol. 55 • OCTOBER 11, 1940 • *No. 41*

RHEUMATIC HEART DISEASE IN PHILADELPHIA HOSPITALS [1]

A Study of 4,653 Cases of Rheumatic Heart Disease, Rheumatic Fever, Sydenham's Chorea, and Subacute Bacterial Endocarditis, Involving 5,921 Admissions to Philadelphia Hospitals From January 1, 1930, to December 31, 1934

V. DISTRIBUTION BY LOCALITY OF RHEUMATIC CONDITIONS IN PHILADELPHIA

By O. F. Hedley, *Surgeon, United States Public Health Service*

As compared with other diseases of equal or even less public health significance, rheumatic heart disease, despite its ubiquitous distribution over the civilized world, has been the object of comparatively few epidemiological investigations. This is especially true of studies of prevalence and distribution in various localities. Such piecemeal information as is now available has been gained for the most part as a result of studies in hospitals and clinics. In the United States few inquiries have been conducted by public health workers, or under the auspices of official or unofficial public health agencies.

This lack of appreciation of rheumatic heart disease as a public health problem is reflected in the leading text and reference books of public health, preventive medicine, and epidemiology. Most authors either pursue a policy of nonrecognition toward the problem in its entirety or at most devote only a few lines or paragraphs to its consideration. Its significance is often obscured because it is grouped with other forms of arthritis, with failure to perceive that the arthritic manifestations of rheumatic fever are for the most part only temporarily disabling and relatively unimportant.

Students of epidemiology should have a special interest in rheumatic fever and chorea for historical reasons. Thomas Sydenham, whose name is so closely associated with chorea minor, one of the most important and widely distributed rheumatic manifestations, was a pioneer in the field of epidemiology. Greenwood (*1*) pays glowing tribute to this "English Hippocrates," citing his insight into the nature and characteristics of epidemic diseases. Many of Sydenham's views have stood the test of time, unshaken by the advent of the test tube, more refined methods of statistical analysis, and a myriad of

[1] From the Division of Infectious Diseases, National Institute of Health.

instruments of precision. Goodall (*2*) also concurred in high praise of Sydenham as an epidemiologist.

The name of Edward Jenner has become so closely associated with the discovery of vaccination against smallpox that sight has been lost of the versatility of this great man The writer (*3*) recently directed attention to source material indicating that Jenner was among the first to observe a relationship between rheumatic fever and heart disease, and suggested that claim to the priority of this concept might possibly be due him.

One of the reasons for the paucity of investigations of the mass effects of rheumatic cardiac conditions and for the lack of interest among public health workers is that, with few exceptions, rheumatic fever and chorea are not included among the notifiable diseases. Morbidity reports systematically afford the epidemiologist a mine of material from which to extract nuggets of knowledge While it is not considered within the scope of the present investigation to propose a methodology for combatting rheumatic heart disease as a public health problem, it is sufficient to state that certain European cities, especially in Great Britain, have pioneered in making rheumatic infections notifiable among school children. Until the outbreak of the present hostilities these cities had schemes in operation for periodic examination and supervision of children with rheumatic cardiac disease.

The results of the present study are without doubt conditioned by the fact that it is based on admissions to hospitals rather than on general morbidity reports; as a consequence it is not based on a representative selection. Any study of hospital cases tends to deal largely with the stratum of society commonly treated on the hospital wards. Although there is general agreement that rheumatic conditions occur with greater frequency among the poorer classes, there is nothing to suggest that these diseases are rare among the better-to-do. Studies by the writer (*4*) and by Paul and Leddy (*5*) indicate that rheumatic heart disease occurs among college students with considerable frequency. It seems evident that many of the rejections among young persons in good economic circumstances applying for relatively large amounts of life insurance must be due to this cause. Rheumatic heart disease is the outstanding valvular heart disease among young persons; valvular heart disease is the type of heart disease most often responsible for rejection or increased ratings among young applicants for life insurance. Since rheumatic heart disease is the end result of rheumatic fever and chorea, it seems probable that these diseases know no social barriers.

When rheumatic fever, Sydenham's chorea, or rheumatic heart disease occur among persons in favorable economic circumstances, hospital treatment is not usually indicated. The prime desideratum

in the treatment of these conditions is rest in bed. Since prolonged rest in bed is usually required, hospital treatment would prove too expensive for all but the extremely wealthy. Aside from possible greater restriction of physical activities and more restful surroundings, treatment usually can be carried out satisfactorily in a well-regulated household. Serious emergencies requiring immediate medical attention are infrequent. At the Children's Heart Hospital in Philadelphia there has not been a sudden death in over 15 years. In children epistaxis is the most severe sudden complication commonly encountered.

This study of the distribution of rheumatic fever, Sydenham's chorea, and rheumatic heart disease in Philadelphia, based on home addresses of hospital cases, is made with full recognition of these limitations. It should be borne in mind that ward patients are admitted from nearly every section of the city. Hence it should be possible to determine by this method the relative frequency, at least among hospital patients, of these diseases in various parts of Philadelphia.

Over two-thirds of the population of Philadelphia probably would require hospitalization for any prolonged or catastrophic illness such as rheumatic heart disease. According to the National Health Survey of 1935-36, 65.9 percent of 32,360 families enumerated were on relief or had incomes less than $1,500 annually (*6*). Members of these families are for the most part medically indigent and commonly obtain medical care in out-patient clinics, from which they are sent to the hospital wards for treatment in case of serious rheumatic conditions. In addition to this group, the National Health Survey indicated that 15.9 percent of the families had incomes of from $1,500 to $2,000 a year. Persons in this economic bracket belong to a marginal group, and are often treated as ward patients on a part-pay or full-pay basis.

REVIEW OF LITERATURE

Thomson (*7*), on the basis of over 800 cases of rheumatic fever and chorea reported by school and hospital physicians, concluded that in Birmingham, England, these diseases were most frequent along the water fronts and that neither density of population, poverty of housing, nor the incidence of other infectious diseases accounted satisfactorily for variations in the incidence of these diseases in different parts of the city. His studies tended to confirm the view often expressed among British writers that rheumatic infection is primarily a disease of the respectable poor, occurring most often in the families of artisans, policemen, and other skilled workers, rather than among the destitute and squalidly poor.

For the sake of uniformity, the home address given at the time of the first hospital admission during the period under study was used, except in fatal cases where the home residence at time of death was used. This obviates difficulties arising from more than one admission, often from the same residence, of any patient. Of the 4,653 cases of rheumatic fever, Sydenham's chorea, rheumatic heart disease, and subacute bacterial endocarditis, 3,804, or 81.8 percent, were admitted only once and consequently had only one home address. In most of the cases admitted more than once only one home address was indicated. Those who moved continued as a rule to reside in the same neighborhood. Figure 1, obtained through the courtesy of the Philadelphia Housing Association, suggests that the map of Philadelphia is a sort of ethnological checkerboard. Although families paying rentals move with the average frequency that tenants change residences, they do not usually move very great distances. In most instances they continue to live in proximity to persons of the same nationality or racial strain.

The hospital records showed that of 1,324 cases of rheumatic fever admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, the home addresses of 1,183 were located in Philadelphia. The remainder either lived outside the city, or the address was unknown or obviously incorrect. As there were few admissions from orphanages and other institutions, the location of these institutions did not constitute an important problem. Of these 1,183 cases of rheumatic fever, 753 also had rheumatic heart disease, while in 430 instances heart disease was not detected.

Figure 2 is a spot map showing the home location of these 1,183 cases of rheumatic fever. This map indicates that with the exception of a greater concentration of cases in South Philadelphia, the section in the lower third of the map between the Delaware and Schuylkill Rivers, there is a fairly even dispersion over the remainder of the city. Slight concentrations are noted in Manayunk (ward 21), in the midsection of Philadelphia just east of Fairmount Park (wards 28, 29, 32, and 38), and in West Philadelphia southwest of Fairmount Park (ward 24).

Figure 3 shows the distribution of rheumatic fever by city wards, based on the mean annual number of cases per 100,000 population according to the United States Census of 1930. The largest number was indicated in wards 1, 4, 5, 6, 9, 11, 12, and 13. These wards are located in a very old and extremely poor part of Philadelphia. With the exception of ward 9, which is occupied mostly by commercial establishments and had a population of only 1,642 persons according to the United States Census of 1930, all of these wards are near the Delaware River.

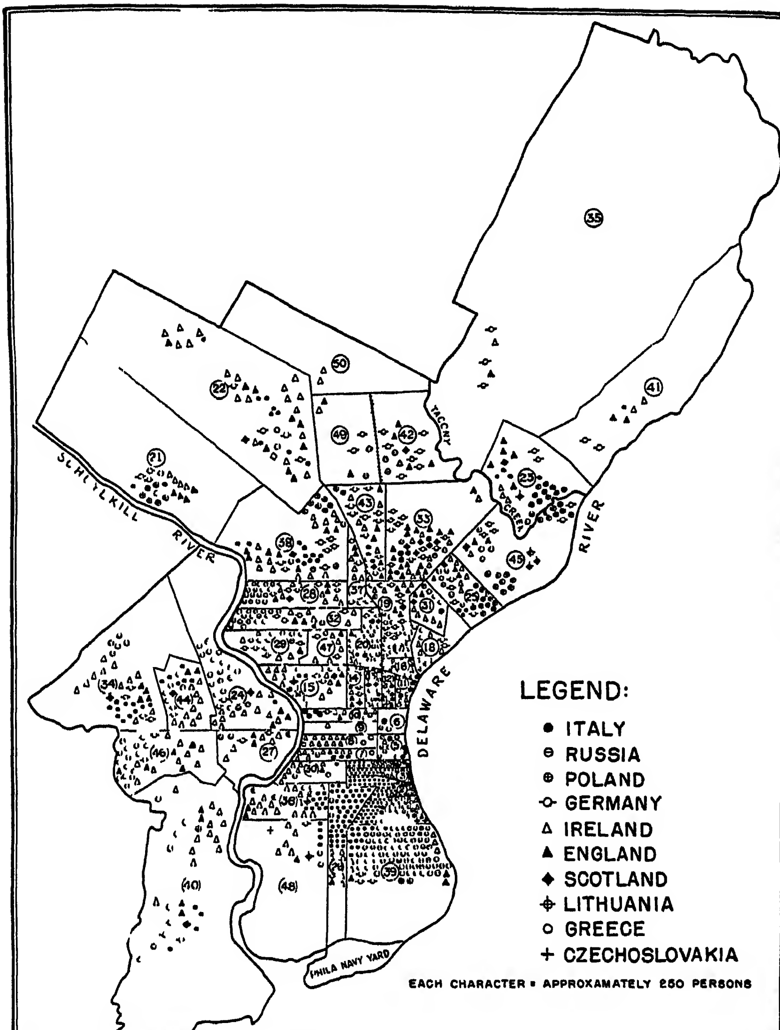

FIGURE 1.—Map of Philadelphia indicating the distribution of persons of foreign birth, based on the U. S. Census of 1930.

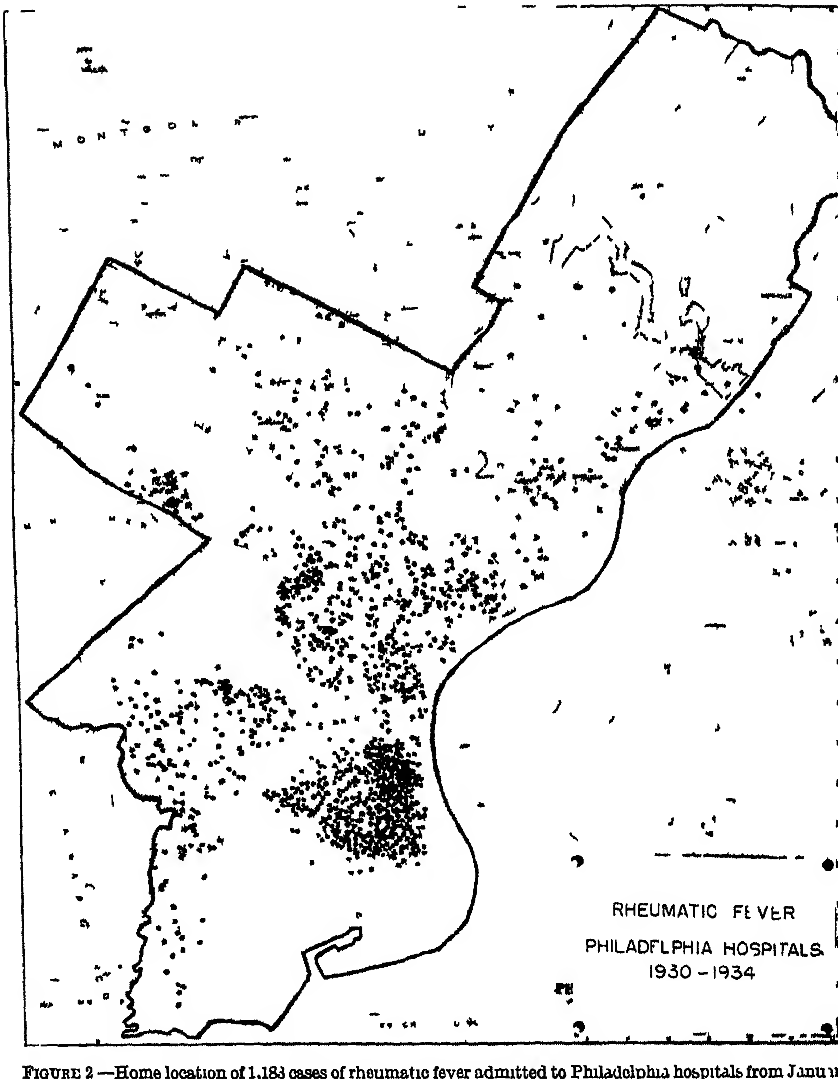

FIGURE 2.—Home location of 1,183 cases of rheumatic fever admitted to Philadelphia hospitals from January 1, 1930 to December 31, 1934

Considering the city as a whole, the largest number of hospital cases per 100,000 population was admitted from South Philadelphia. This is one of the oldest sections, is flat, and contains many persons living under extremely unfavorable economic conditions. The high incidence is doubtless influenced by the accessibility of hospital facilities. A number of large hospitals, including the Pennsylvania

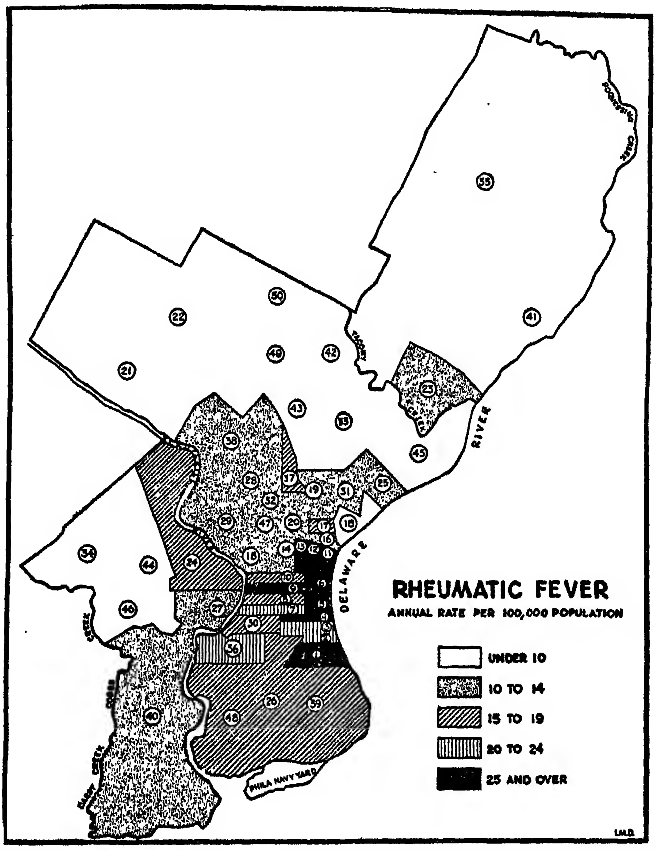

FIGURE 3.—Distribution by city wards of 1,183 cases of rheumatic fever admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the mean annual number of cases per 100,000 population. Population based on U. S. Census of 1930.

Hospital, Graduate Hospital, Jefferson Hospital, and the Children's Hospital are located in or near this area, while it is in close proximity to the Hospital of the University of Pennsylvania, Philadelphia General Hospital, and the Presbyterian Hospital, which are located in West Philadelphia just across the Schuylkill River.

Figures 2 and 3 seem to indicate that proximity to watercourses does not influence admissions to hospitals for rheumatic fever. With the exception of a large number of cases per 100,000 population in wards 1, 4, 5, 6, and 11, the situation in other wards along the banks

of rivers varies considerably. In any event, these maps do not suggest a tendency for the distribution of rheumatic fever in Philadelphia to follow the banks of streams, as noted in several cities in Great Britain (*13*, *14*, *15*, *19*) and in New York City (*10*).

This is due in part to the topography, the density and degree of poverty of the population, and the extent to which land along the banks of the Schuylkill and Delaware Rivers is used for residential purposes, in contradistinction to commercial purposes and for parks. The Delaware is the principal river of commerce. Much of its water front is lined with docks. Land adjacent to the river is occupied largely by commercial establishments, either factories or railroad sidings. The terrain is flat and of low altitude along the entire course of the river in Philadelphia. Part of South Philadelphia, which is not extremely densely populated, is recovered marshland. A study of figures 2 and 3 indicates that there is no tendency for rheumatic fever to occur with greater frequency along its banks or to follow the course of this river.

Except in Manayunk (ward 21) few persons live in close proximity to the Schuylkill River. The terrain here is extremely hilly. It is far from damp, although because of the almost precipitous slopes some of the homes probably become flooded during heavy rainfall. This part of the city has more than average sunlight, facing in a westerly direction. The atmosphere may be vitiated at times by smoke from the steel mills in the Schuylkill Valley. During the period under study most of the steel mills were not operating. This area is not as densely populated as some other sections, but is occupied by extremely poor persons of Polish, English, Irish, and German nativity or extraction. The steel mills were closed or operated on a very reduced scale from the outset of the economic depression, and dire poverty resulted. According to figure 2, a small but appreciable number of cases was admitted from this section, probably indicative of the poverty which prevails.

Lower down the Schuylkill River few dwellings are located in close proximity to its banks. For a long distance Fairmount Park is situated between the river and residential areas. These areas are for the most part occupied by persons in better than average economic circumstances, with the exceptions of ward 24 in West Philadelphia and wards 28 and 32 along its eastern border, occupied largely by Jewish persons and some Irish and Negroes living under poor but not squalid conditions. Slight aggregations of rheumatic fever in these sections are indicated in figure 2. These parts of Philadelphia are flat but not low, since the banks of the Schuylkill form a plateau on either side of the river along this part of its course.

Reference is made to figure 1 for an explanation of the aggregations of rheumatic fever in hospitals mentioned in the preceding paragraph.

Each symbol in figure 1 equals approximately 250 persons These areas are occupied largely by Jewish persons of Russian birth or extraction. Since the death rates from rheumatic heart disease were no higher among the Jewish population than among gentiles (see Part III of this series of articles), the higher rate of admissions is probably due to a greater tendency to seek hospitalization

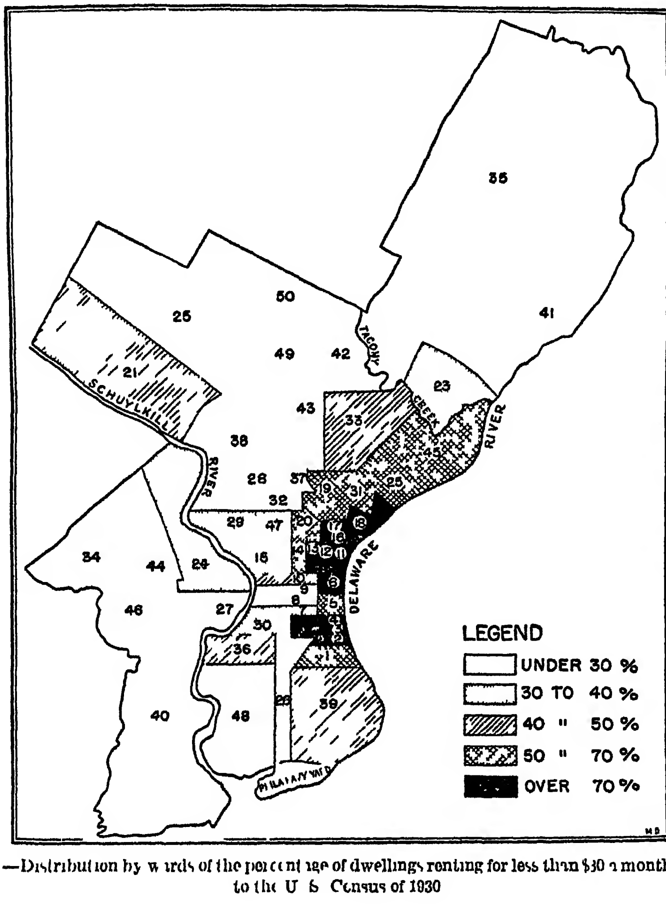

FIGURE 1.—Distribution by wards of the percentage of dwellings renting for less than $30 a month, according to the U S Census of 1930

Further down the Schuylkill River the banks become flat and somewhat marshy. Few homes are situated in close proximity to its banks, along which are located some railroads, the University of Pennsylvania, commercial establishments, oil tanks, and a large area of undeveloped land.

Figure 4 is a map showing the percentage of low rental dwellings in each ward, and is in a measure an indication of the degree of poverty. This map is based on the percentage of dwellings which rented for less than $30 per month in 1930. The data were obtained through

the courtesy of the Philadelphia Housing Association. Comparing figures 3 and 4 it is noted that although a high incidence of rheumatic fever was often noted in wards with the highest percentage of low rentals, the relationship was not invariable. Wards 2, 3, 16, 17, and 18, in which over 70 percent of the buildings rented for less than $30 a month, were not among the wards with the highest number of admissions for rheumatic fever. This may be accounted for in part

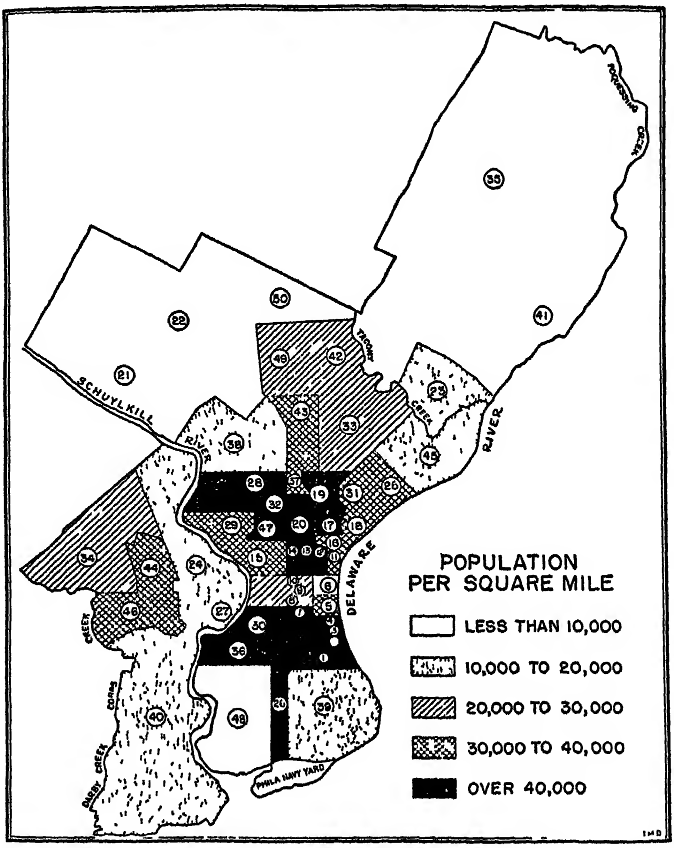

FIGURE 5.—Population of Philadelphia per square mile according to wards, based on the U. S. Census of 1930.

by the racial strains of the inhabitants of these wards. Polish people, for instance, do not ordinarily seek admission to hospitals as readily as certain other racial groups.

Conversely, in wards 1 and 9, in which the numbers of hospital cases of rheumatic fever per 100,000 population were extremely high, the greatest degree of poverty as indicated by low rentals did not seem to prevail. Many wards with over 50 percent of houses renting for less than $30 a month did not have a disproportionately high incidence of rheumatic fever.

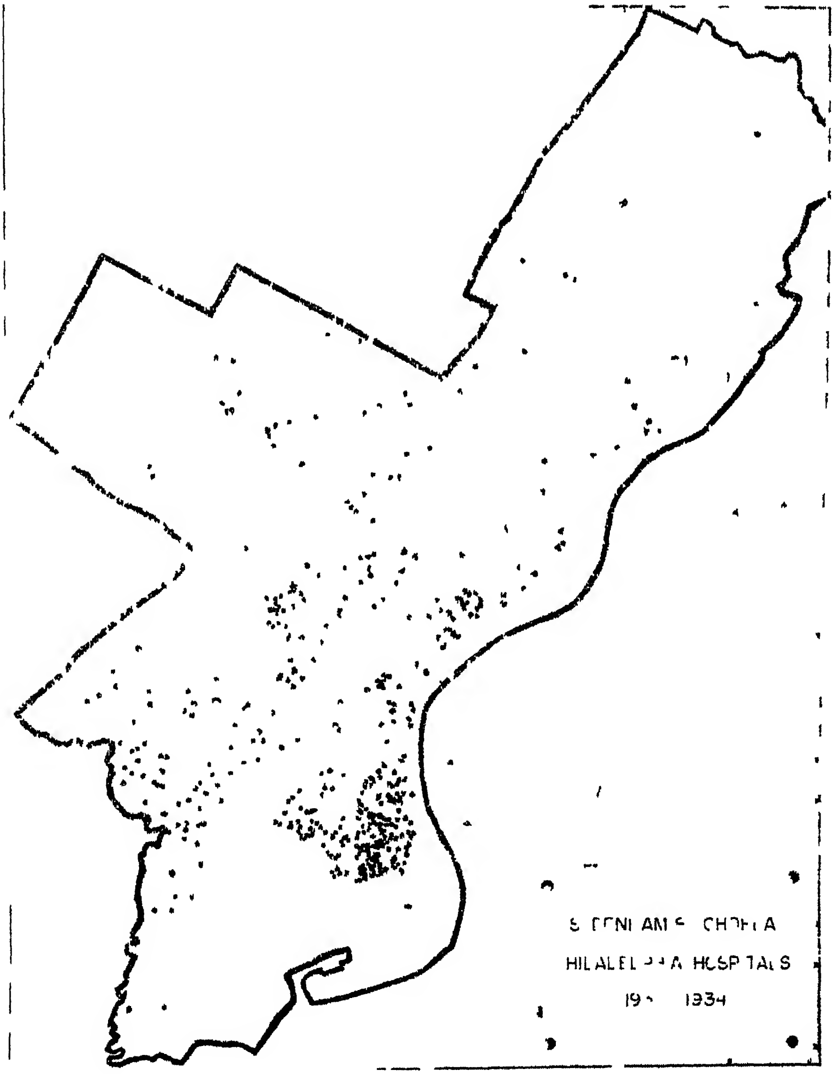

Figure 6. Home location of [illegible] cases of Sydenham's chorea admitted to Philadelphia hospitals from January 1, 1930 to December 31, 1934

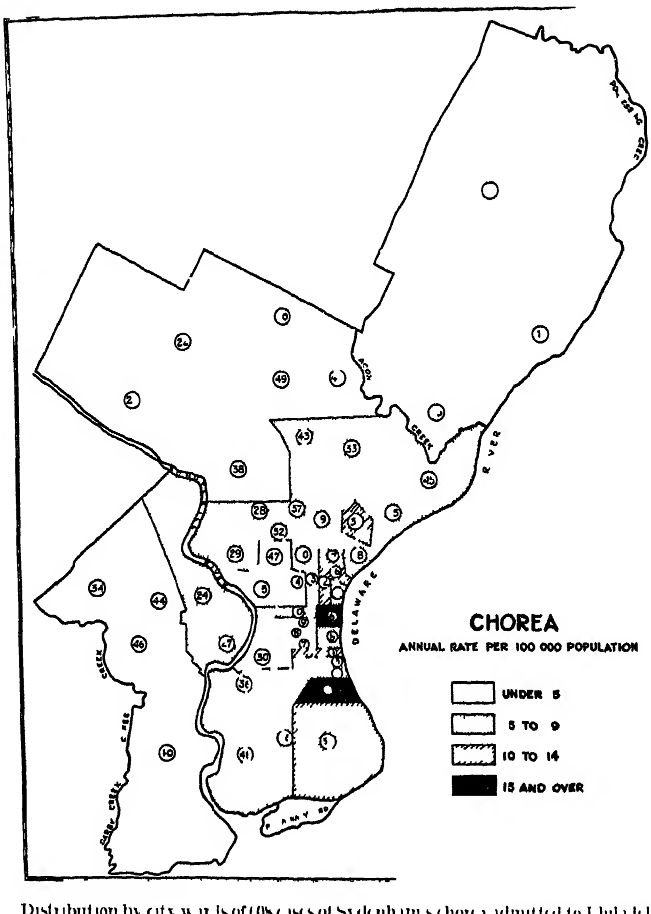

FIGURE 7. Distribution by city wards of 608 cases of Sydenham's chorea admitted to Philadelphia hospitals from January 1, 1930 to December 31, 1934 based on the mean annual number of cases per 100,000 population. Population based on U. S. Census of 1930.

Comparison of figures 3 and 4 indicates that the distribution of poverty as indicated by low rentals more nearly follows the course of the Delaware River than does the distribution of rheumatic fever. Studies suggesting a relationship between proximity to water courses and rheumatic fever should be interpreted with the fact in view that poor people tend to live along the water front.

The population per square mile as ascertained by the United States Census of 1930 is shown in figure 5, which was also obtained through the courtesy of the Philadelphia Housing Association. Comparison with figure 3 suggests that density of population is not per se a factor of prime importance. A number of wards with the greatest density of population do not show the greatest number of cases in hospitals of rheumatic fever per 100,000 population. Several factors may be in part responsible. Wards 20, 28, 30, 36, and 47 are occupied largely by colored persons, who constitute a somewhat abnormal group because of recent migration. In parts of some of the other wards, such as wards 5, 6, 11, and 16, the actual density of population is greater than figure 5 indicates, because these wards are largely occupied by industrial establishments. The comparatively small numbers of persons residing in these wards often live under the most squalid circumstances and in a state of chronic overcrowding. Ward 46 in West Philadelphia, a ward with many apartment houses, has a population of 30,000 to 40,000 per square mile. The economic conditions are above average and the rate of admission for rheumatic fever is among the lowest. A low admission rate for rheumatic fever is also indicated in ward 44, with 30,000 to 40,000 population in less favorable, but not squalidly poor economic conditions.

SYDENHAM'S CHOREA

Figure 6 is a spot map showing the home location of 608 cases of chorea, of which 251 were associated with rheumatic heart disease, and 357 were instances of simple Sydenham's chorea. The distribution of cases was not dissimilar to that of rheumatic fever (figure 2) except that chorea was more evenly distributed. There was probably a relatively smaller number of cases of chorea in South Philadelphia, taking into consideration the total of each disease.

The mean annual number of hospital cases of chorea per 100,000 population by city wards is shown in figure 7. This figure also suggests that, although chorea is only slightly over half as frequent as rheumatic fever, its distribution is more general and there is less tendency for it to occur with greater frequency in certain wards. Chorea was somewhat more common in the eastern half of South Philadelphia and as far north along the Delaware River as ward 17. There was no marked tendency for chorea to occur with greater frequency along

the courses of the Delaware and Schuylkill Rivers. The disease was less common in wards occupied largely by Negroes.

Comparing figure 7 with figures 4 and 5, no very positive relationship is suggested between hospital admissions for Sydenham's chorea and poverty as indicated by low rentals, and overcrowding as indicated by density of population. As in the instance of rheumatic

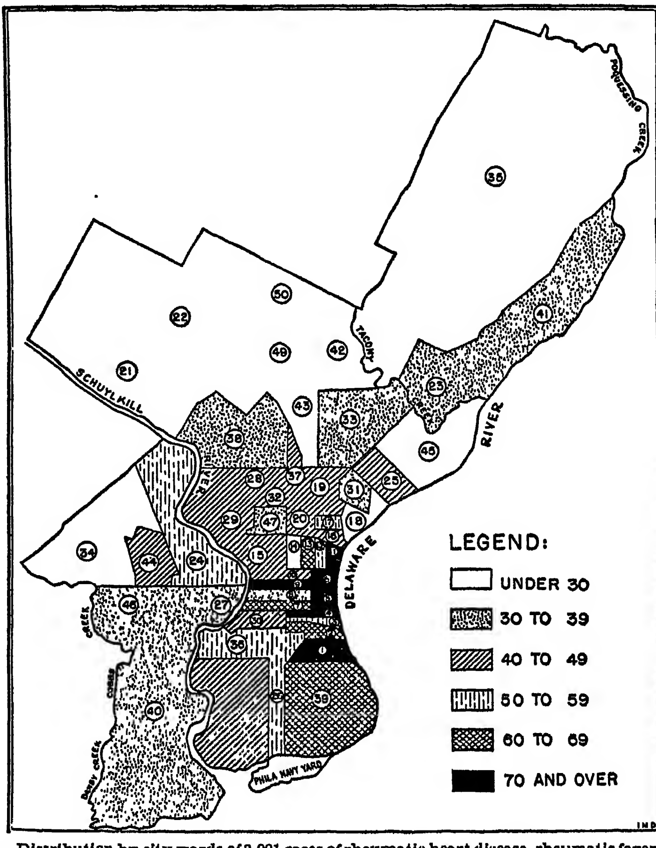

FIGURE 8.—Distribution by city wards of 3,991 cases of rheumatic heart disease, rheumatic fever, and Sydenham's chorea, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the mean annual number of cases per 100,000 population. Population based on U. S. Census of 1930.

fever, admissions to hospitals were low in all of the wards in which economic conditions are better than average, such as wards 35, 42, 49, and 50.

ALL RHEUMATIC CONDITIONS

The mean annual number of admissions per 100,000 population by wards for 3,991 cases of rheumatic heart disease, rheumatic fever, and Sydenham's chorea admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, is shown in figure 8. With the exception of the better residential areas and wards 14, 18, and 45, admissions

for this group of diseases were very widely distributed. Wards 14 and 18 are in the poorest parts of Philadelphia. Ward 45 is occupied largely by the families of skilled laborers, often persons engaged in the textile industry.

The largest number of hospital admissions per 100,000 population is indicated in the eastern half of South Philadelphia. Wards 1, 4, 5, 6, and 11, located in South Philadelphia and north along the Delaware River, and ward 9 in the midcity, had the highest rates. These wards, in the oldest part of Philadelphia, are extremely poor and congested, and with a low altitude. They are occupied for the most part by white persons. Hospital facilities are no more available in these wards than in a number of other parts of the city. Other wards with an equal degree of poverty do not have as high admission rates for rheumatic conditions. Furthermore, with the exception of these wards and some wards in South Philadelphia, these diseases did not occur more frequently in wards along the rivers.

RHEUMATIC HEART DISEASE AMONG PERSONS UNDER 20 YEARS OF AGE

Figure 9 is a spot map showing the home distribution of 1,824 nonfatal cases of rheumatic heart disease among persons under 20 years of age. With the exception of a large number of cases in South Philadelphia east of Broad Street, a fairly even distribution is indicated in parts of the city inhabited by persons in the poorer economic groups. Comparatively few cases are noted in the northern and northeastern sections and in parts of West Philadelphia, sections of the city populated for the most part by persons of better-than-average economic status.

The large number of cases in South Philadelphia is attributable to several factors. (The large black area in fig. 9 comprises 98 cases.) The section south of Broad Street is perhaps the oldest part of Philadelphia. It is low in altitude. Housing conditions are bad, rentals low (fig. 4), and the area is quite congested (fig. 5). There are also more large hospitals and health agencies in this part of the city. The large dark area is populated largely by Jewish persons of Russian extraction and to a less extent by persons of Italian extraction (fig. 1). As mentioned in the instance of rheumatic fever, certain racial groups are more prone to avail themselves of hospital facilities.

This figure also suggests little tendency for this disease to follow the course of rivers. Aside from South Philadelphia no clusters of admissions of significant size were noted. Rheumatic heart disease among persons under 20 years of age did not occur as frequently as might be anticipated from their poor economic circumstances in wards occupied to any great extent by Negroes. This applies especially to wards 30, 27, 24, 14, 15, 20, 32, and 47.

FATAL CASES

Figure 10 is a spot map showing the home location at time of death of 603 fatal cases of rheumatic heart disease. This map indicates a more general distribution of fatal cases than of the home location of admissions for rheumatic fever, Sydenham's chorea, rheumatic heart disease among persons under 20 years of age, and all rheumatic conditions in Philadelphia. Comparatively more fatal cases, considering that the series is smaller, are indicated in the better-to-do residential sections. This suggests that other manifestations are more likely to occur among the underprivileged than are deaths from rheumatic heart disease, which, while also more frequent among the underprivileged, occur with relatively greater frequency among the better-to-do.

This suggests an analogy between rheumatic heart disease and pulmonary tuberculosis. Both of these conditions occur with greater frequency among the poor. Fulminating pulmonary tuberculosis, such as miliary tuberculosis, is rather infrequent among persons in better circumstances, while fibroid phthisis is more likely to occur among persons under better economic surroundings. Extremely acute manifestations of rheumatic infection, such as rheumatic fever, Sydenham's chorea, or fulminating pancarditis, are relatively infrequent among the better-to-do; slowly progressive, fibrosing mitral stenosis, while still less common than among the poverty stricken, is more likely to occur than these overtly acute rheumatic phenomena. In both rheumatic heart disease and tuberculosis these differences are conditioned by better treatment, ability to obtain more rest, less arduous occupations, and other considerations. It should also be borne in mind that many better-to-do persons with rheumatic heart disease probably acquire the disease while living under less favorable circumstances.

Figure 11 indicates a wide distribution of deaths in hospitals from rheumatic heart disease in Philadelphia, with a higher incidence in the wards in which clinical manifestations of rheumatic infection are most common. The highest rates per 100,000 population are noted in the eastern half of South Philadelphia and in the midsection of the city, and are maximal in wards 4, 5, and 6. Only in these areas do deaths from this cause tend to occur with greatest frequency in wards adjacent the water front. Comparing this figure with figures 4 and 5, no close relationship to poverty as expressed by low rentals or density of population is suggested.

SUMMARY

A review of the literature indicates a considerable lack of agreement concerning the roles of proximity to watercourses and dampness due to low altitude in the causation of rheumatic fever and chorea. The consensus of most investigations suggests that these diseases are

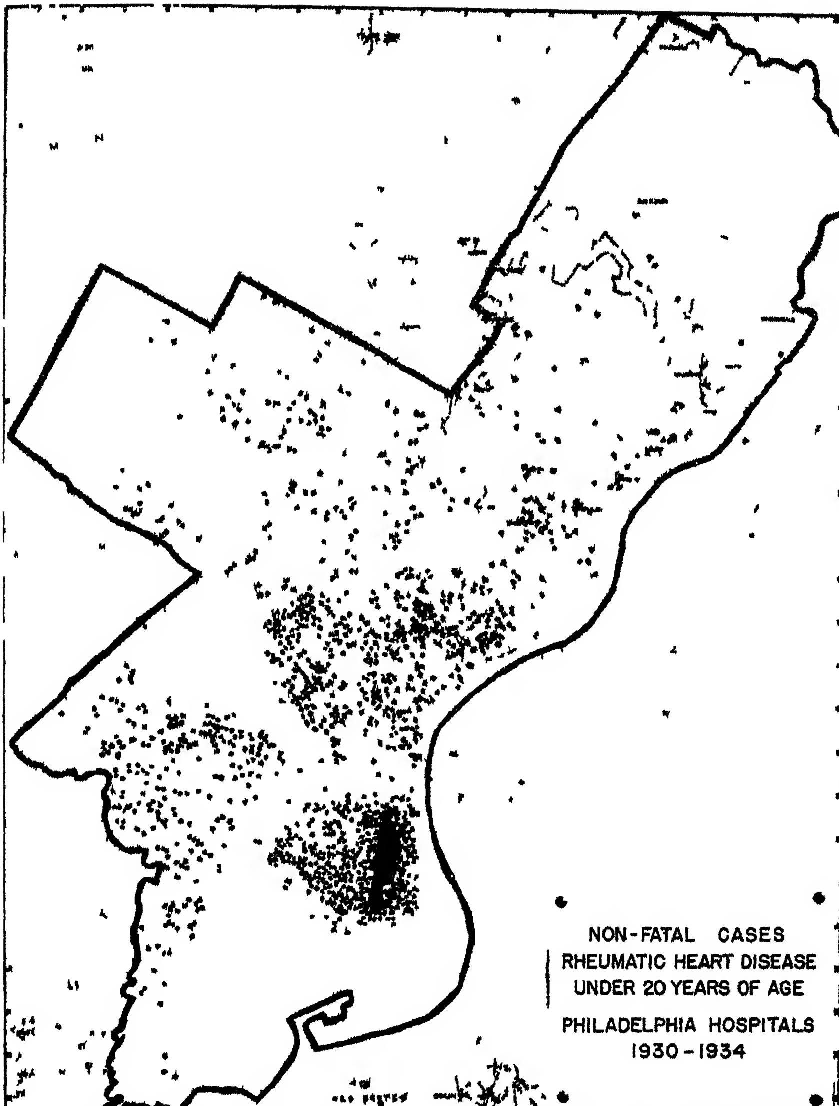

FIGURE 9 Home distribution of 1,824 nonfatal cases of rheumatic heart disease among persons under 20 years of age admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934

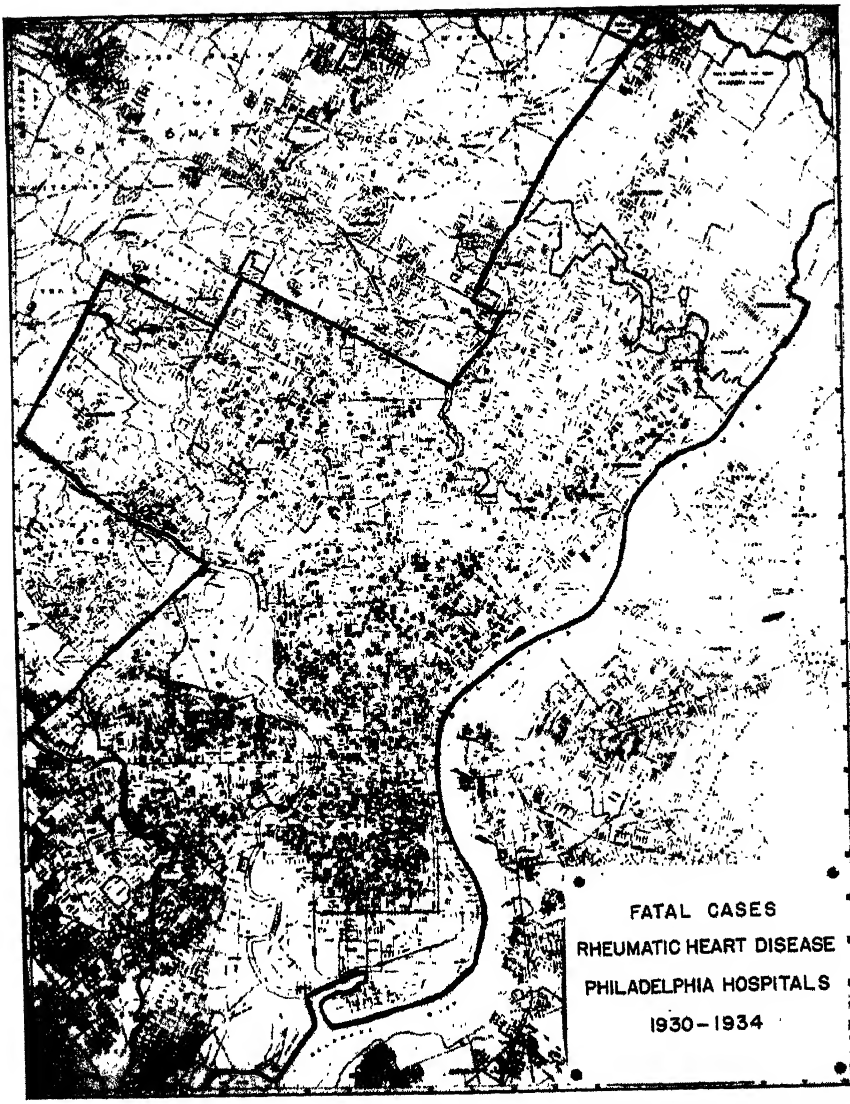

FIGURE 10.—Home location at time of death of 603 fatal cases of rheumatic heart disease admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

distinctly more prevalent in areas occupied by the underprivileged than the better-to-do.

Rheumatic fever, Sydenham's chorea, and nonfatal and fatal rheumatic heart disease among hospital patients in Philadelphia tended to occur with greatest frequency in the sections of the city occupied to a large extent by the poor. This relationship was not, however, invariable. Some of the city wards in which the rentals were lowest and the

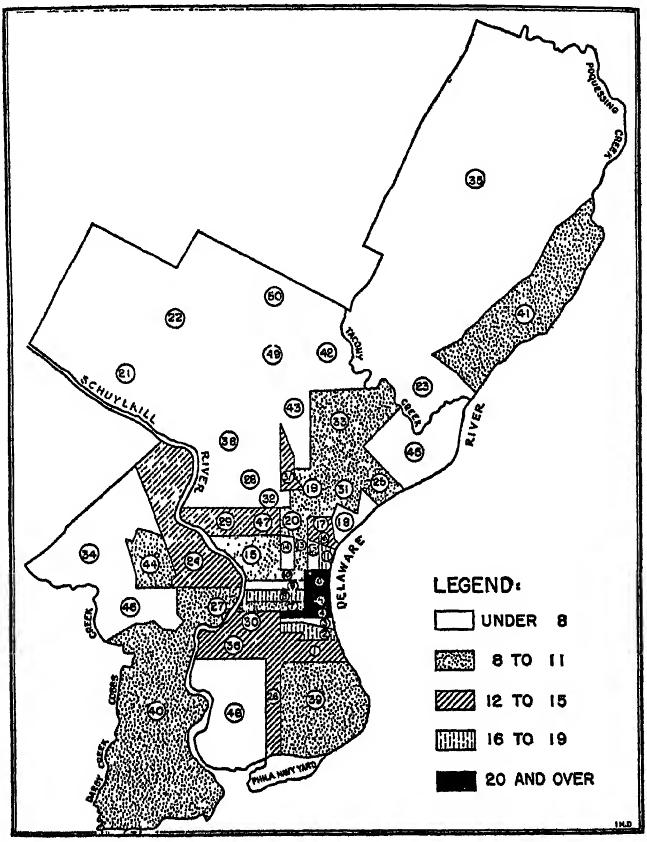

FIGURE 11.—Distribution by city wards of 603 fatal cases of rheumatic heart disease, based on home address at time of death, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on mean annual number of deaths per 100,000 population. Population based on U. S. Census of 1930.

density of population greatest did not have the greatest number of hospital admissions or deaths per 100,000 population. A low rate of admissions and deaths was noted in every city ward inhabited for the most part by persons living under reasonably favorable economic circumstances. This is doubtless due in no small measure to the fact that persons in the better-to-do economic brackets do not regularly seek admission to hospitals for the treatment of medical conditions.

It is difficult to escape the impression that the conditions under study occur with the greatest frequency in sections of the city occupied by poverty-stricken persons.

These diseases tended to occur with greatest frequency in the eastern half of South Philadelphia and in a section of the midcity near the Delaware River.

These studies do not suggest that proximity to a watercourse is an important factor. The distribution of low rentals corresponded more closely to the Delaware River water front than the distribution of rheumatic fever and chorea.

Relatively low rates of admissions and deaths in hospitals from these diseases were indicated in a number of city wards occupied largely by colored persons.

The distribution of Sydenham's chorea is roughly comparable to rheumatic fever, except that a somewhat more general distribution is indicated. It is even less common than rheumatic fever in city wards occupied largely by Negroes.

A more general distribution was indicated in mortality from rheumatic heart disease in hospitals than of admissions for rheumatic fever, Sydenham's chorea, and rheumatic heart disease. This suggests that the more acute or fulminating forms of rheumatic infection occur with relatively greater frequency among the extremely poor. An analogy is noted between tuberculosis and rheumatic infection.

ACKNOWLEDGMENTS

This study would not have been made possible had it not been for the kind and generous cooperation of the late Dr. Alfred E. Stengel, vice president for medical affairs of the University of Pennsylvania and member of the advisory council of the National Institute of Health. To that wise teacher of medicine and friend of public health and to many members of the medical faculty of the University of Pennsylvania, especially Drs. Charles C. Wolferth and Francis C. Wood, the writer acknowledges a debt of gratitude.

The writer is particularly grateful to the College of Physicians of Philadelphia for access to its splendid library. This library serves as a pattern of all that a medical library should be; its quiet, congenial atmosphere and the ready availability of its wide range of medical literature make study a pleasure. The attitude of friendliness and helpfulness of its staff is rarely equalled and never excelled.

Permission to review and abstract the clinical records which form the basis of these studies was granted without delay by every hospital which was approached. The record librarians were uniformly prompt and cooperative. The writer also wishes to thank Mr. Bernard J. Newman, director of the Philadelphia Housing Association, for permission to use several maps prepared by that organization.

A number of members of the Public Health Service furnished assistance in many ways. The writer is deeply grateful to Medical Director A. M. Stimson for reviewing the manuscripts and for his sympathetic understanding over a number of years. To Principal Statistician Selwyn D. Collins, he is grateful for his painstaking analysis of the statistical material, and for a number of constructive suggestions. Miss Inez Demonet, medical artist of the National Institute of Health, is responsible for the many attractive illustrations. Acknowledgment is also made of the loyal, efficient, and cheerful services of the office personnel, Miss Margaret E. Hook and Mrs. Christine A. Hibsman.

REFERENCES

(*1*) Greenwood, Major: Sydenham as an epidemiologist. Proc. Royal. Soc. Med., 12: 55 (1918–19). (Epidemiology and state medicine.)
(*2*) Goodall, E. W., and Washbourn, J. W.: Text-book of Infectious Diseases, 3d ed. of Goodall and Washbourn's Manual of Infectious Diseases; rev. and in large part rewritten by E. W. Goodall. H. K. Lewis and Co., London, 1928.
(*3*) Hedley, O. F.: Contributions of Edward Jenner to modern concepts of heart disease. Am. J. Pub. Health, 28: 1165 (1938).
(*4*) Hedley, O. F.: Incidence of rheumatic heart disease among college students in the United States. Pub. Health Rep., 53: 1635 (1938).
(*5*) Paul, J. R., and Leddy, P. A.: The social incidence of rheumatic heart disease. A statistical study in Yale University students. Am. J. Med. Sci., 184: 597 (1932).
(*6*) Preliminary reports, the National Health Survey. Population series. Bulletin A. Division of Public Health Methods, National Institute of Health, U. S. Public Health Service, Washington, 1938.
(*7*) Thomson, A. P.: Study of distribution of rheumatic infection in children in Birmingham. Arch. Dis. Childhood, 3: 20 (1928).
(*8*) Paul, J. R.: The epidemiology of rheumatic fever. A preliminary report with special reference to environmental factors in rheumatic heart disease and recommendations for future investigations for the American Heart Association, 1930. Metropolitan Life Insurance Co., New York, 1930.
(*9*) Shrubsall, F. C.: London County Council. Ann. Report of the Council, 1925. III. Public Health. Published by the London County Council, 1926. P. 126.
(*10*) Ingerman, Eugenia, and Wilson, May G.: Rheumatism: Its manifestations in childhood today. J. Am. Med. Assoc., 82: 759 (1924).
(*11*) Coombs, Carey F.: Rheumatic Heart Disease. Wm. Wood and Co., New York City, 1924.
(*12*) Coombs, Carey F.: Thirty years progress in the study of rheumatic heart disease. Bristol Medico-Chirurg. J., 50: 93 (1933).
(*13*) Miller, Reginald: Discussion on the etiology and treatment of heart disease in early life; with special reference to the prevention of chronic cardiac insufficiency. Brit. Med. J., 2: 702 (1923).
(*14*) Miller, Reginald: Report on the environmental and other predisposing causes of rheumatic infection. Supplement to Brit. Med. J., 2: 5 (1926).
(*15*) Langmead, F. S.: The rheumatic school child. Lancet, 1: 941 (1920).
(*16*) Coates, Vincent, and Thomas, R. E.: Rheumatic infection in childhood. Lancet, 2: 326 (1925).
(*17*) Medical Research Council, Great Britain. Child Life Investigations. Social conditions and acute rheumatism. Special report series No. 114. His Majesty's Stationery Office, London, 1927.
(*18*) Maddox, Kenneth: Metropolitan and rural incidence and distribution of acute rheumatism and rheumatic heart disease in New South Wales. Part III. The distribution of rheumatic fever in the metropolis of Sydney. Australia Med. J., 1: 464 (1937).

(19) Maddox, Kenneth: Metropolitan and rural incidence and relation of acute rheumatism and rheumatic heart disease in New South Wales. Part III. Distribution of rheumatic heart disease in New South Wales. Australia Med. J., 1: 425 (1937).

(20) Hedley, O. F.: Trends, geographical, and racial distribution of mortality from heart disease among persons 5–24 years of age in the United States during recent years (1922–1936). Pub. Health Rep., 54: 2271 (1939).

RICKETTSIA DIAPORICA: ITS PERSISTENCE IN THE TISSUES OF *ORNITHODOROS TURICATA*[1]

By Gordon E. Davis, *Bacteriologist, United States Public Health Service*

In a continuation of studies on ticks of the genus *Ornithodoros* as vectors of infectious agents, it has been found that *Rickettsia diaporica* may persist in the tissues of *O. turicata* for at least 1,001 days but is not transmitted during the process of feeding.

On June 21, 1937, 38 ticks in the late nymphal stages engorged on a guinea pig ill with the original Montana strain of American "Q" fever (nine-mile fever). They were subsequently tested at irregular intervals (1) for transmission of *R. diaporica* and (2) for the presence of this organism in the tissues. The former tests were made by allowing the tick to engorge completely on guinea pigs and to detach voluntarily, thereby insuring the wetting of the bite wound with coxal fluid, the latter by injecting, subcutaneously, saline suspensions of ground ticks. Temperatures of all test animals were taken daily. If death ensued, autopsies were performed to determine the character of any gross lesions. If the animal survived, it was tested for immunity by injecting controlled doses of infective spleen tissue.

Test feedings on guinea pigs.—Four ticks died without being tested and 2 were injected without test feedings. A total of 88 test feedings were made with the remaining 32 ticks. The earliest tests were approximately 7 weeks, and the latest 20 months, following the infective feeding. In no instance did the host guinea pig show evidence of infection.

Tests by injection of a saline suspension of the macerated tick into guinea pigs.—Five additional ticks died and were not tested by injection. The results of injecting the remaining 29 ticks are shown in table 1. The tick number, the number of days after the infective feeding, the number of days after the last feeding, the total number of feedings, and the sex and stage are given. Twenty-two ticks (5 nymphs, 7 males, and 10 females) produced typical infections, while 7 ticks (2 nymphs, 4 males, and 1 female) failed to produce the infection. The earliest and latest "positive" injections were made at 0 and 1,001 days, respectively, while the earliest and latest "negative" injections were at 82 and 900 days, respectively.

[1] From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health.

An attempt to recover R. diaporica from the progeny of female ticks (table 2).—Progeny were tested as follows: From 1 female that died and was not injected—114 larvae by feeding, 70 by injection; 12 nymphs by feeding, 9 by injection; from 6 females that were "positive" when injected—1,804 larvae by feeding, 833 by injection; 556 nymphs by feeding, 129 by injection; from one female that was "negative" when injected—261 larvae by feeding, 92 by injection; 213 nymphs by feeding, 76 by injection.

TABLE 1.—*The persistence of R. diaporica in the tissues of O. turicata*

Tick No.	Injected, days after infective feeding	Injected, days after last feeding	Total test feedings	Stage or sex
Positive tests:				
1	0	0	0	nymph
11	51	51	0	nymph
2	71	21	1	female
12	82	1	1	nymph
31	82	1	1	nymph
25	86	0	2	nymph
10	99	40	1	male
32	124	15	2	female
13	207	17	3	female
24	267	2	3	male
20	301	191	2	female
22	413	3	6	female
16	488	4	3	male
7	585	3	4	male
38	623	10	5	female
5	651	164	3	male
14	698	214	2	male
23	738	254	3	male
Positive tests—continued				
37	791	17	5	female
3	827	159	7	female
28	987	112	5	female
9	1, 001	434	5	female
Total 22			64	
Negative tests:				
18	82	1	1	nymph
6	88	0	2	male
17	99	5	2	nymph
27	594	4	5	male
35	728	530	2	male
21	823	339	5	male
15	900	63	7	female
Total 7			24	

None of the test guinea pigs showed evidence of infection.

The infectivity of tick excrement.—At irregular intervals the excreta from a tick-storage vial was washed out with a small amount of physiologic saline and injected subcutaneously into a guinea pig. Eight such tests were made. All material was from ticks which produced typical infections when injected and 6 of these tests were positive. The shortest and longest periods after feeding, when tests were made, were less than an hour and 16 days, respectively.

DISCUSSION

In a previous report (*1*) it was shown that: (1) *O. turicata* may sustain *Bact. tularense* in its tissues for at least 674 days but does not transmit this organism during the process of feeding; (2) that the organism was not transmitted to the progeny; and (3) that the virulence of the organism was not adversely affected by its long residence in the tick or by prolonged fasting of the tick.

TABLE 2.—*Tests of progeny of O. turicata that ingested infective blood*

Number of females	Larvae: Fed	Larvae: Injected	1st to 4th stage nymphs: Fed	1st to 4th stage nymphs: Injected
	Progeny tested from female that died and was not injected			
1	114	70	12	9
	Progeny tested from females "positive" when injected			
6	1,804	833	556	129
	Progeny tested from female "negative" when injected			
1	261	92	213	76

These new data show that this tick may also sustain *R. diaporica* for as long as 1,001 days, as determined by the injection of tick tissue into guinea pigs, but, as with *Bact. tularense*, does not transmit *diaporica* during the process of feeding. Neither was the organism transmitted through the egg to the next generation. Tick excrement, when injected, produces a typical infection.

No evidence of the phenomenon of "reactivation" as reported by Spencer and Parker (*2*) for the spotted fever rickettsia was encountered with *R. diaporica* in *O. turicata*, as 7 ticks injected 112, 159, 164, 191, 214, 254, and 434 days, respectively, following the last feeding produced typical infections with death on the tenth, eighth, eleventh, ninth, thirteenth, tenth, and sixth days, respectively. The average day of death for 22 guinea pigs reported in table 1 was the tenth day, with a minimum of 6 days and a maximum of 18.

SUMMARY

1. *Rickettsia diaporica* may survive in the tissues of *Ornithodoros turicata* for at least 1,001 days but is not transmitted during the process of feeding; neither is it transmitted through the egg to the next generation.

2. The virulence of the organism is not adversely affected by its long residence in the tick or by prolonged fasting of the tick.

3. Tick excrement is infective.

REFERENCES

(*1*) Davis, Gordon E.: *Bacterium tularense:* Its persistence in the tissues of the argasid ticks, *Ornithodoros turicata* and *O. parkeri*. Pub. Health Rep., **55**: 66–7 680 (1940).

(*2*) Spencer, R. R., and Parker, R. R.: Rocky Mountain spotted fever: Infectivity of fasting and recently fed ticks. Pub. Health Rep., **38**: 333–339 (1923).

HOME CARE OF SICK [1]

General Statement.

A majority of the persons who are sick in the United States today are being cared for in their homes. Some knowledge of the general principles of the care of the sick is highly desirable when, for economic or other reasons, skilled nursing service cannot be secured. When home care is intelligently applied, it not only promotes the comfort and welfare of the patient, but it can serve the physician in attendance effectively as the source of much helpful information on the progress of the case. Because special care will be prescribed in many instances by the attending physician, only such general measures as are applicable to all cases will be considered in this leaflet.

The average home does not lend itself conveniently to the care of a very sick patient. Every effort should be made to provide hospital care for seriously ill persons.

Persons Caring for the Sick.

Persons caring for the sick should maintain a cheerful and sympathetic attitude at all times. Only clothing that can be laundered and kept scrupulously clean should be worn. The hands should be washed with soap and running water immediately after each handling of the patient. When running water is not available an assistant may pour water over the hands of the attendant.

Under no circumstances should an attempt be made to *diagnose* or to *treat* the patient. Any suggestions offered by "well meaning" visitors should be ignored.

It is a good practice to write down the physician's orders so that details will not be forgotten.

Observations That Are Helpful to the Physician.

When there is illness in the home, the physician will appreciate a written record of observations made during his absence.

These observations should include:

1. Temperature—morning, afternoon, and evening.
2. Quality and duration of sleep.
3. Number and kind of bowel movements.
4. Amount of urine passed in 24 hours
5. Items and amount of food eaten.
6. Amount of liquids taken (including water, fruit juices, tea, milk, etc.).
7. Attitude of patient (irritable, fearful, cheerful, contented, etc.).

Selection of Room.

When possible, the patient should be placed in a room not used by another member of the family. The room should be well lighted, and easily ventilated, and near the bathroom and toilet, if such facilities

[1] This material is available in leaflet form and a limited number of copies may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

are available. All unnecessary furniture and hangings should be removed. The windows should be well screened and provided with adjustable window shades. The room should be thoroughly cleaned and the dust removed daily with a damp cloth.

Attention should be given to the patient's preferences concerning the temperature and lighting of the room. Members of the household should cooperate in maintaining quiet and in affording the patient privacy. In cases of serious illness, any discussion of the disease in the patient's presence should not be permitted.

Sick Room Equipment.

In addition to a comfortable bed, the minimum equipment for a sick room should include:

1. A complete set of toilet articles for the patient, including comb, brush, toothbrush, wash basin, soap, wash cloth, towels; bedpan or chamber should be furnished if the patient's condition requires.

2. A clinical thermometer and cotton or tissues for wiping the thermometer before and after using. Cleansing with soap and water will satisfactorily disinfect a thermometer.

3. Paper napkins or tissues for nose and throat discharges and a paper bag for the used tissues.

4. A washable gown or coverall apron for the attendant to wear while in the sick room.

5. If running water is not available, an additional basin, pitcher of water, and soap and towel should be provided for the attendant's use. (The attendant should wash his hands and arms thoroughly before and after waiting on the patient.)

The Bed.

If available, a single bed equipped with a firm spring and mattress should be selected. Most home beds are too low for the care of a patient without undue strain on the attendant. The bed may be raised to the desired height by placing a block of wood under each leg. Be sure casters are removed before placing bed on blocks. It will add greatly to the patient's comfort to have the bed level.

The bedclothing should be of lightweight washable materials. Do not use heavy comforters or fancy spreads which cannot easily be laundered. The mattress should be protected by a washable pad, and for children or patients who cannot control body discharges, additional protection should be provided through the use of a rubber sheet or a piece of oilcloth. If neither is available, a useful substitute is afforded by sewing a muslin cover over about 24 double pages of newspaper.

To Change Sheet Under Patient.

1. Gently roll patient over to one side of bed.
2. Fold soiled sheet close up against the body.

3. Fold the clean sheet in narrow pleats and adjust to the mattress as close to the patient as possible, and tuck well at the side, the head and foot of bed.

4. Gently roll patient to the side of the bed covered by the clean sheet.

5. Withdraw soiled sheet, and pull the clean sheet in place.

6. Smooth sheet of wrinkles and tuck tightly on that side and at the head and foot of the bed.

All of these changes can be accomplished without uncovering the patient.

Preparation of Patient for the Day.

The face and hands should be washed, the teeth brushed, and the hair combed soon after the patient has fully awakened. A daily sponge bath is both refreshing and stimulating. Upon completion of the toilet, the patient's back should be rubbed with alcohol, especially those places on which the weight falls—the back, shoulders, heels, and elbows. This will help maintain good circulation of blood and may prevent the development at these pressure spots of "bed sores," which are very painful and heal slowly.

Diet.

The diet of a patient should be governed by the advice of the physician in attendance. Until the arrival of the physician, it is usually safe to allow the patient a soft or liquid diet, consisting of milk, eggs, milk toast, orange juice, or broth. Food served in an attractive manner helps to stimulate the appetite.

Laxatives and Enemas.

The use of laxatives and enemas should be left to the advice of the physician.

Secretions.

All secretions of the nose and throat should be collected in paper tissues and promptly burned.

Hot Water Bottle.

Never fill a hot water bottle with *boiling* water. Bottles should be half filled and the air expelled by squeezing the bottle until water comes to the top. The stopper should then be inserted. The bag should be covered with a bath towel or piece of flannel before applying it to the skin, to avoid burning the patient.

Communicable Diseases.

Most communicable diseases are more "catching" during the first days of illness, and frequently before the diagnosis has been established. It is well to consider every illness communicable until the physician has decided otherwise. Therefore, no one but the attendant should be permitted to enter the sick room.

It is advisable to wash with soap and water and to scald eating and drinking utensils after each use by the patient and to keep them separate from utensils used by other members of the family.

Where to Obtain Instructions in Nursing Care.

Every community should have a public health nursing service. One of the functions of the public health nurse is to teach home hygiene and the care of the sick. If your community has a public health nurse or nursing unit, you should avail yourself of the opportunity to secure instruction in approved methods of nursing care.

When a member of the family is ill, ask the community public health or visiting nurse to come to your home to demonstrate approved nursing methods. This nurse may assist you to a clearer understanding of the physician's orders, and she can help you in many ways to make the patient more comfortable.

PROPER CARE OF THE SICK ADDS TO THE PATIENT'S COMFORT AND WILL DO MUCH TO HASTEN RECOVERY

COURT DECISION ON PUBLIC HEALTH

City health district held to be a State agency.—(Ohio Supreme Court; *State ex rel. Mowrer* v. *Underwood et al.*, 27 N. E. 2d 773; decided May 22, 1940.) Under the statutes of Ohio the State, for the purposes of local health administration, was divided into health districts, each city constituting a city health district. The law creating such health districts repealed the then existing statutes authorizing municipalities to establish and appoint boards of health as part of their local governments. In a case where it was contended, on one side, that the department of health of the city of Akron was a department of the city government and, on the other, that said department was an agency of the State, the Ohio Supreme Court said that in its opinion the abovementioned repeal evidenced a legislative intent to withdraw from municipalities the powers of local health administration previously granted to them and to create in each city a health district which was to be a separate political subdivision of the State, independent of the city with which it was coterminous, and to delegate to it all the health powers thus withdrawn from municipalities. "As such," said the court, "the city health district becomes an agency of the State and is governed by the laws of the State."

The court took the view that to so hold was not to interfere with municipal home rule, as the constitutional provision, authorizing municipalities to exercise all powers of local self-government and to adopt and enforce such local police, sanitary, and other similar regulations as were not in conflict with general laws, did not grant absolute

powers of self-government but limited their exercise to matters and things purely local in nature. "The protection and preservation of public health is of a state-wide concern, with respect to which the legislature has jurisdiction."

Another section of the health district act provided for the establishment of a board of health by the council of each city constituting a city health district and contained a proviso that nothing in the act should "be construed as interfering with the authority of a municipality constituting a municipal health district making provision by charter for health administration other than as in this section provided." This proviso was construed by the supreme court as authorizing a municipality constituting a city health district to make reasonable provision, by charter, for supplementing the health administration work covered by the section. The court did not agree with the contention that, by virtue of the proviso, a charter city was authorized to set up a health board "different than" that provided in the section involved.

The opinion concluded with the statement, "We hold that where the State, by legislative enactment, withdraws from cities the health powers previously granted to them and transfers them to newly created city health districts, such health districts become agencies of the State government, and their employees are governed by State law."

DEATHS DURING WEEK ENDED SEPTEMBER 28, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Sept. 28, 1940	Correspond ing week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,489	7,784
Average for 3 prior years	7,803	
Total deaths, first 39 weeks of year	329,691	324,092
Deaths under 1 year of age	524	489
Average for 3 prior years	495	
Deaths under 1 year of age, first 39 weeks of year	19,580	19,581
Data from industrial insurance companies:		
Policies in force	64,826,298	66,640,202
Number of death claims	10,752	12,325
Death claims per 1,000 policies in force, annual rate	8.7	9.6
Death claims per 1,000 policies, first 39 weeks of year, annual rate	9.8	10.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 5, 1940

Summary

The number of cases of poliomyelitis reported for the current week was 555, as compared with 711 for the preceding week and with a 5-year (1935–39) median of 391. Although the number of cases reported currently is nearly 42 percent above the median, the sharp decline from the preceding week indicates that the peak of this disease for the current year has been reached. As compared with the preceding week, decreases were recorded in all geographic areas except the Pacific, where there was an increase in the number of cases from 28 to 30. The two North Central areas and the South Atlantic States reported 467 cases, or 84 percent of the total. Most of the States in these areas, however, reported decreases.

In addition to poliomyelitis, decreases were also recorded for meningococcus meningitis and typhoid fever, while the other 6 diseases included in the weekly table registered slight increases, in conformity with their seasonal expectancies. No unusual prevalence of any of these diseases was noted.

Of these 9 communicable diseases, the cumulative totals to date of only two—influenza and poliomyelitis—are higher than the 5-year medians, while for all except these two diseases and scarlet fever the cumulative totals are less than for the corresponding period last year.

During the current week, 3 cases of Rocky Mountain spotted fever were reported, 2 cases of undulant fever, 2 cases of encephalitis, and 64 cases of endemic typhus fever.

The Bureau of the Census reports 7,776 deaths for the current week in 88 major cities of the United States, as compared with 7,489 for the preceding week, and with a 3-year (1937–39) average of 7,698 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended October 5, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Oct. 5, 1940	Oct. 7, 1939		Oct. 5, 1940	Oct. 7, 1939		Oct. 5, 1940	Oct. 7, 1939		Oct. 5, 1940	Oct. 7, 1939	
NEW ENG.												
Maine	2	0	1	1	------	------	28	5	7	0	1	0
New Hampshire	0	0	0	------	------	------	0	4	1	0	0	0
Vermont	0	0	0	------	------	------	0	10	5	2	0	0
Massachusetts	2	6	5	------	------	------	97	54	36	0	1	1
Rhode Island	2	0	0	------	------	------	1	15	0	1	0	1
Connecticut	0	2	2	1	1	1	5	3	4	0	0	1
MID. ATL.												
New York	15	10	11	[1] 8	[1] 4	[1] 8	93	38	45	1	0	5
New Jersey	11	3	7	2	6	7	29	6	10	0	1	1
Pennsylvania	7	18	20	------	------	------	148	26	34	1	1	2
E. NO. CEN.												
Ohio	21	38	38	16	4	1	16	19	19	2	1	1
Indiana [2]	8	14	17	7	1	13	1	2	4	1	0	0
Illinois	10	17	23	2	3	11	25	13	13	2	0	1
Michigan	12	3	17	5	17	1	60	4	24	0	3	8
Wisconsin	2	1	4	14	10	17	124	27	27	2	1	1
W. NO. CEN.												
Minnesota	2	1	6	2	1	1	3	0	5	0	0	0
Iowa	3	9	8	1	------	1	13	5	3	0	0	0
Missouri	6	7	19	------	2	28	1	0	3	0	0	1
North Dakota	2	1	2	20	------	------	2	0	1	0	0	0
South Dakota	4	0	1	------	------	------	4	3	2	0	0	0
Nebraska	0	0	3	------	------	------	10	10	1	1	1	0
Kansas	8	3	6	1	3	3	3	30	4	1	1	1
SO. ATL.												
Delaware	0	1	1	------	------	------	1	0	2	0	0	0
Maryland [2, 3]	7	3	9	1	5	3	5	2	3	0	1	2
Dist. of Col.	0	3	7	------	------	------	0	0	0	0	1	1
Virginia [4]	16	70	64	30	28	------	19	6	8	0	2	2
West Virginia [3]	10	21	21	7	5	8	1	1	1	2	1	1
North Carolina [3]	44	99	107	2	1	4	13	15	15	0	0	1
South Carolina [3]	20	15	18	139	106	106	6	0	0	0	0	0
Georgia [2]	30	45	40	15	24	------	2	3	0	0	0	0
Florida [2]	6	5	8	1	2	1	0	2	2	0	1	0
E. SO. CEN.												
Kentucky	15	28	32	------	4	5	16	17	13	1	1	1
Tennessee [4]	12	35	48	14	4	10	81	6	2	0	1	2
Alabama [2]	14	32	44	10	12	12	5	9	1	1	0	0
Mississippi [2, 3]	15	24	23	------	------	------	------	------	------	1	0	0
W. SO. CEN.												
Arkansas	17	18	25	14	11	11	0	1	1	0	0	0
Louisiana [2]	9	13	18	------	5	5	1	3	3	0	0	0
Oklahoma	14	12	21	15	17	32	3	0	1	0	2	2
Texas [2]	44	27	48	143	97	97	15	23	16	2	2	1
MOUNTAIN												
Montana	2	13	1	27	3	2	33	12	12	1	0	0
Idaho	0	0	0	------	------	1	3	1	1	0	1	0
Wyoming [4]	0	0	0	2	------	------	0	62	11	0	0	0
Colorado	5	16	6	7	11	------	19	12	10	0	1	1
New Mexico	8	3	3	------	------	------	11	2	8	0	0	0
Arizona	1	1	1	61	46	24	17	1	2	0	1	0
Utah [3]	0	1	0	2	1	------	1	3	3	0	0	0
Nevada	6	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	4	0	1	------	------	------	4	100	15	0	1	0
Oregon	4	0	2	9	8	13	7	20	7	0	0	0
California	12	12	34	20	23	18	35	77	71	1	2	0
Total	432	630	740	599	474	506	961	652	682	23	29	49
40 weeks	[5] 10,782	15,438	18,437	172,612	154,626	143,529	233,429	351,834	351,834	1,298	1,554	4,548

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 5, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Oct. 5, 1940	Oct. 7, 1939		Oct. 5, 1940	Oct. 7, 1939		Oct. 5, 1940	Oct. 7, 1939		Oct. 5, 1940	Oct. 7, 1939	
NEW ENG.												
Maine	0	0	0	2	24	11	0	0	0	0	0	3
New Hampshire	0	1	1	1	1	1	0	0	0	0	0	0
Vermont	0	6	2	4	4	5	0	0	0	0	0	0
Massachusetts	2	6	6	35	25	57	0	0	0	1	2	2
Rhode Island	0	0	0	1	3	4	0	0	0	0	0	0
Connecticut	1	0	1	7	13	20	0	0	0	5	3	3
MID. ATL.												
New York	6	77	43	101	83	145	0	0	0	10	17	20
New Jersey	1	10	9	30	33	33	0	0	0	2	7	7
Pennsylvania	11	28	12	85	120	142	0	0	0	15	15	26
E. NO. CEN.												
Ohio	44	12	7	121	186	142	0	0	0	12	24	24
Indiana [2]	23	3	3	44	57	83	1	13	1	2	0	3
Illinois	27	7	23	141	116	159	2	0	1	11	21	21
Michigan	84	38	25	100	114	117	0	0	0	4	7	7
Wisconsin	36	10	6	51	69	85	1	0	1	1	3	3
W. NO. CEN.												
Minnesota	23	40	4	28	32	53	2	1	0	0	0	0
Iowa	70	14	9	28	49	42	0	5	2	1	5	5
Missouri	24	0	1	24	41	42	0	0	1	21	11	11
North Dakota	3	0	0	11	8	12	3	0	1	1	0	2
South Dakota	10	6	1	9	12	14	1	0	0	3	0	1
Nebraska	20	1	1	15	9	9	3	0	0	2	0	0
Kansas	27	4	4	34	76	76	0	0	0	6	3	3
SO. ATL.												
Delaware	0	1	0	2	6	4	0	0	0	0	2	2
Maryland [2 3]	2	2	2	18	24	29	0	0	0	4	8	10
Dist. of Col.	0	1	1	4	8	8	0	0	0	1	0	1
Virginia [4]	20	1	2	24	32	34	0	0	0	6	13	15
West Virginia [3]	48	3	3	29	46	78	0	0	0	2	7	10
North Carolina [2]	3	4	3	61	72	68	0	0	0	14	3	14
South Carolina [2]	0	3	1	22	5	5	0	0	0	11	5	7
Georgia [2]	2	6	2	29	24	22	0	0	0	14	15	13
Florida [2]	1	0	0	7	4	4	0	0	0	0	1	1
E. SO. CEN.												
Kentucky	10	7	3	50	43	43	1	0	0	11	18	10
Tennessee [4]	2	1	1	70	40	45	0	0	0	16	6	22
Alabama [2]	0	1	1	15	29	19	0	0	0	7	3	9
Mississippi [2 3]	1	1	1	14	6	15	0	0	0	3	1	7
W. SO. CEN.												
Arkansas	1	2	0	17	9	9	0	0	0	13	17	16
Louisiana [2]	4	0	0	2	3	11	0	0	0	10	12	12
Oklahoma	3	4	2	14	9	19	1	1	1	5	22	17
Texas [2]	7	14	2	16	21	32	0	0	0	16	49	30
MOUNTAIN												
Montana	2	2	0	13	11	18	0	0	7	0	1	3
Idaho	3	0	0	9	4	4	0	0	1	1	0	1
Wyoming [4]	0	1	0	4	3	12	0	0	0	0	3	0
Colorado	1	12	8	11	17	17	0	9	2	3	8	4
New Mexico	1	8	0	4	6	6	0	0	0	7	7	13
Arizona	0	0	0	4	4	4	0	0	0	0	1	2
Utah [3]	2	10	1	1	8	10	0	0	0	2	3	2
Nevada	0	------	------	0	------	------	0	------	------	2	------	------
PACIFIC												
Washington	20	1	2	18	21	22	1	0	3	2	8	3
Oregon	2	1	1	8	19	23	0	0	0	0	1	1
California	8	42	18	95	83	102	0	4	3	5	12	12
Total	555	391	391	1,436	1,632	2,181	16	33	33	252	344	455
40 weeks	6,918	[5] 5,290	5,290	125,612	124,297	174,922	2,036	8,846	8,374	7,693	10,434	11,619

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 5, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended Oct. 5, 1940	Whooping cough, Week ended Oct. 7, 1939
NEW ENG.		
Maine	17	7
New Hampshire	2	6
Vermont	1	31
Massachusetts	117	62
Rhode Island	7	16
Connecticut	64	24
MID. ATL.		
New York	201	286
New Jersey	95	61
Pennsylvania	358	225
E. NO. CEN.		
Ohio	256	99
Indiana [2]	15	33
Illinois	109	197
Michigan	318	41
Wisconsin	90	149
W. NO. CEN		
Minnesota	23	51
Iowa	23	10
Missouri	18	15
North Dakota	12	26
South Dakota	4	4
Nebraska	5	5
Kansas	33	5
SO. ATL.		
Delaware	26	1
Maryland [2, 3]	74	54
Dist. of Col	1	14
Virginia [4]	25	26
West Virginia [3]	21	12
North Carolina [2]	139	47
South Carolina [2]	23	13
Georgia [2]	5	11
Florida [2]	3	3

Division and State	Whooping cough, Week ended Oct. 5, 1940	Whooping cough, Week ended Oct. 7, 1939
E. SO. CEN.		
Kentucky	108	58
Tennessee [4]	27	32
Alabama [2]	18	34
Mississippi [2, 3]	----------	----------
W. SO. CEN.		
Arkansas	7	3
Louisiana [2]	3	3
Oklahoma	12	0
Texas [2]	85	39
MOUNTAIN		
Montana	1	1
Idaho	1	2
Wyoming [4]	0	1
Colorado	8	10
New Mexico	23	8
Arizona	9	16
Utah [3]	9	33
Nevada	0	----------
PACIFIC		
Washington	17	11
Oregon	10	28
California	240	116
Total	2,669	1,929
40 weeks	125,572	143,682

[1] New York City only.
[2] Typhus fever, week ended October 5, 1940, 64 cases as follows: Indiana, 1; Maryland, 1; North Carolina, 1; South Carolina, 8; Georgia, 20; Florida, 1; Alabama, 9; Mississippi, 2; Louisiana, 6; Texas, 15.
[3] Period ended earlier than Saturday.
[4] Rocky Mountain spotted fever, week ended October 5, 1940, 3 cases as follows: Virginia, 1; Tennessee, 1; Wyoming, 1.
[5] Owing to errors in transmission, 1 case of diphtheria was reported in New Jersey for the week ended September 21, 1940, instead of 3 cases, and 9 cases of poliomyelitis, instead of no cases, were reported in Ohio for the week ended April 15, 1939.

WEEKLY REPORTS FROM CITIES

City reports for week ended September 21, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	118	46	14	142	309	380	2	325	72	1,009	--------
Current week [1]	52	38	13	203	239	331	4	297	65	1,090	--------
Maine:											
Portland	0	------	0	0	2	0	0	0	0	4	17
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	9
Nashua	0	------	0	0	0	1	0	0	0	0	2
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	9
Rutland	0	------	0	0	1	0	0	0	0	0	4
Massachusetts:											
Boston	0	------	0	4	8	6	0	5	3	54	197
Fall River	0	------	0	0	2	0	0	1	0	0	24
Springfield	0	------	0	1	1	5	0	0	0	0	34
Worcester	0	------	0	18	3	1	0	1	0	1	58
Rhode Island:											
Pawtucket	0	------	0	0	0	1	0	0	0	0	10
Providence	0	------	0	0	0	0	0	2	1	4	54
Connecticut:											
Bridgeport	0	2	2	1	0	0	0	1	0	4	36
Hartford	0	------	0	0	2	0	0	1	0	0	36
New Haven	0	------	0	0	1	0	0	0	1	18	36
New York:											
Buffalo	0	------	0	1	6	8	0	6	0	1	113
New York	9	2	1	28	54	38	0	58	10	105	1,383
Rochester	0	------	0	0	1	0	0	1	0	21	67
Syracuse	0	------	0	0	2	2	0	0	0	6	41
New Jersey:											
Camden	0	------	0	3	1	2	0	0	0	0	23
Newark	0	------	0	12	5	11	0	8	0	33	99
Trenton	0	------	0	0	1	1	0	0	2	0	27
Pennsylvania:											
Philadelphia	1	1	1	50	8	17	0	17	1	100	383
Pittsburgh	0	------	1	1	10	7	0	6	0	46	152
Reading	0	------	0	1	0	0	0	0	0	22	11
Scranton	1	------	--------	0	-------	0	0	-------	0	1	--------
Ohio:											
Cincinnati	2	------	0	0	0	6	0	5	0	13	120
Cleveland	0	13	3	0	8	8	0	6	2	68	190
Columbus	0	------	0	0	2	4	0	1	0	19	77
Toledo	0	------	0	1	2	11	0	0	0	12	68
Indiana:											
Anderson	0	------	0	0	0	1	0	1	0	0	6
Fort Wayne	0	------	0	0	2	0	0	0	0	1	21
Indianapolis	1	------	1	0	5	4	0	3	2	18	74
Muncie	1	------	0	0	2	0	0	0	0	1	15
South Bend	0	------	0	0	1	0	0	1	0	0	17
Terre Haute	0	------	0	1	0	0	0	0	1	0	11
Illinois:											
Alton	0	------	0	0	0	0	0	0	1	1	7
Chicago	9	2	1	15	14	66	0	24	2	62	643
Elgin	0	------	0	0	0	1	0	0	0	2	10
Springfield	0	------	0	1	2	3	0	0	0	0	19
Michigan:											
Detroit	3	1	0	29	1	31	0	17	2	143	220
Flint	0	------	0	0	5	1	0	1	0	7	23
Grand Rapids	0	------	1	2	0	4	0	1	0	36	48
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	0	7
Madison	0	------	0	2	0	0	0	0	0	2	6
Milwaukee	0	------	0	9	0	5	0	2	0	8	89
Racine	0	------	0	0	0	0	0	0	0	0	14
Superior	0	------	0	0	0	1	0	0	0	1	6
Minnesota:											
Duluth	0	------	0	0	0	0	4	0	1	0	26
Minneapolis	0	------	0	3	2	10	0	2	2	18	8[illegible]
St. Paul	0	------	0	1	2	1	0	2	1	10	6[illegible]

[1] Figures for Barre and Raleigh estimated; reports not received.

City reports for week ended September 21, 1940

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Iowa:											
Cedar Rapids	0	------	------	0	------	2	0	------	0	0	------
Des Moines	0	------	0	1	0	9	0	0	1	0	28
Sioux City	0	------	------	0	------	1	0	------	0	0	------
Waterloo	1	------	------	0	------	1	0	------	1	0	------
Missouri:											
Kansas City	0	------	0	1	4	4	0	6	1	12	99
St. Joseph	0	------	0	0	5	0	0	1	0	0	24
St. Louis	5	------	0	0	8	12	0	0	1	17	166
North Dakota:											
Fargo	0	------	0	0	1	2	0	0	0	1	5
Grand Forks	0	------	------	0	------	0	0	------	0	1	------
Minot	1	------	0	1	0	0	0	0	0	1	6
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	0	------
Sioux Falls	0	------	0	0	0	0	0	0	0	0	8
Nebraska:											
Lincoln	0	------	------	0	------	1	0	------	0	4	------
Omaha	0	------	0	1	3	2	0	1	0	0	45
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	2
Topeka	0	------	0	0	5	3	0	0	0	1	21
Wichita	0	------	0	0	3	0	0	0	0	7	27
Delaware:											
Wilmington	0	------	0	1	0	1	0	0	1	3	15
Maryland:											
Baltimore	3	1	0	0	4	4	0	17	2	62	181
Cumberland	0	------	0	0	1	0	0	1	0	0	12
Frederick	0	------	0	0	1	0	0	0	0	0	7
Dist. of Col.:											
Washington	1	------	0	0	2	3	0	19	4	7	153
Virginia:											
Lynchburg	0	------	0	0	0	0	0	0	0	1	7
Norfolk	0	------	0	2	2	0	0	1	0	3	21
Richmond	0	------	0	0	0	4	0	2	0	0	56
Roanoke	0	------	0	0	0	0	0	0	1	12	16
West Virginia:											
Charleston	0	------	------	0	------	1	0	------	1	0	------
Huntington	0	------	------	0	------	1	0	------	1	0	------
Wheeling	0	------	0	0	0	0	0	0	0	4	22
North Carolina:											
Gastonia	2	------	------	0	------	0	0	------	0	0	------
Raleigh	------	------	------	------	------	------	------	------	------	------	------
Wilmington	1	------	0	0	0	0	0	0	0	0	14
Winston-Salem	4	------	0	0	1	2	0	2	0	16	18
South Carolina:											
Charleston	0	1	0	0	1	1	0	0	3	0	19
Florence	0	4	0	0	1	0	0	0	1	0	6
Greenville	0	------	0	0	0	1	0	1	0	1	15
Georgia:											
Atlanta	1	1	0	0	3	1	0	4	0	3	71
Brunswick	0	------	------	0	------	0	0	------	0	0	------
Savannah	0	2	0	0	0	2	0	1	0	0	29
Florida:											
Miami	0	1	1	0	2	1	0	1	0	0	23
Tampa	1	------	0	1	1	0	0	0	0	0	22
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	0	0	1
Covington	0	------	0	0	0	1	0	1	1	0	11
Lexington	0	------	0	8	0	0	0	2	1	1	17
Louisville	1	------	0	1	1	5	0	2	0	14	76
Tennessee:											
Knoxville	0	------	0	0	0	2	0	1	0	0	25
Memphis	0	------	0	0	0	6	0	5	3	2	82
Nashville	0	------	0	0	2	5	0	2	1	3	47
Alabama:											
Birmingham	0	------	0	0	2	3	0	2	0	0	55
Mobile	0	2	1	0	1	4	0	1	4	0	21
Montgomery	0	------	------	0	------	0	0	------	0	1	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	0	------
Little Rock	0	2	0	1	2	0	0	1	0	2	------
Louisiana:											
Lake Charles	0	------	0	0	1	1	0	1	0	0	7
New Orleans	0	------	0	0	12	0	0	13	0	3	148
Shreveport	1	------	0	0	2	1	0	1	2	0	23
Oklahoma:											
Oklahoma City	0	2	0	0	3	0	0	0	0	0	41
Tulsa	0	------	0	0	0	1	0	0	0	10	12

City reports for week ended September 21, 1940

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Texas:											
Dallas	2	------	0	0	0	1	0	0	3	1	48
Fort Worth	0	------	0	0	1	0	0	3	0	2	41
Galveston	0	------	0	0	1	0	0	0	0	0	24
Houston	2	------	0	2	4	1	0	5	5	0	67
San Antonio	1	1	0	1	5	1	0	6	0	5	49
Montana:											
Billings	0	------	0	0	0	1	0	0	0	0	3
Great Falls	0	------	1	0	1	0	0	1	0	1	10
Helena	0	------	0	0	0	0	0	0	0	0	4
Missoula	0	------	0	0	0	0	0	0	0	0	2
Idaho:											
Boise	0	------	0	0	2	1	0	0	0	0	4
Colorado:											
Colorado Springs	0	------	0	0	0	2	0	0	0	0	14
Denver	0	------	0	4	1	6	0	4	0	3	80
Pueblo	0	------	0	0	0	0	0	0	0	0	9
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	0	0	0	15
Utah:											
Salt Lake City	0	------	0	0	0	0	0	0	1	18	20
Washington:											
Seattle	1	------	0	1	2	2	0	6	0	2	104
Spokane	0	------	0	0	1	0	0	0	0	2	29
Tacoma	0	------	0	0	0	2	0	0	0	0	32
Oregon:											
Portland	3	------	0	1	5	2	0	2	0	3	78
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	3	6	0	2	4	8	0	15	1	54	349
Sacramento	1	1	0	0	2	4	0	0	0	2	24
San Francisco	0	--	0	1	5	1	0	7	0	31	164

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	0	1	1
New York:			
Buffalo	1	0	0
New York	1	0	6
New Jersey:			
Newark	0	0	2
Pennsylvania:			
Philadelphia	1	0	8
Pittsburgh	0	0	2
Ohio:			
Cincinnati	0	0	8
Cleveland	0	0	2
Columbus	0	0	2
Toledo	0	0	1
Indiana:			
Anderson	0	0	1
Fort Wayne	0	0	4
South Bend	0	0	4
Illinois:			
Alton	0	0	1
Chicago	1	0	18
Elgin	0	0	1
Springfield	0	0	1
Michigan:			
Detroit	0	0	9
Flint	0	0	3
Grand Rapids	0	0	6
Wisconsin:			
Madison	0	0	5
Racine	0	0	1
Minnesota:			
Duluth	0	0	1
Minneapolis	0	0	1
Iowa:			
Des Moines	0	0	7
Sioux City	0	0	3
Waterloo	0	0	4
Missouri:			
Kansas City	0	1	10
St. Joseph	1	0	2
St. Louis	0	0	2
South Dakota:			
Sioux Falls	0	0	1
Nebraska:			
Lincoln	0	0	2
Omaha	0	0	5
Kansas:			
Topeka	0	0	3
Virginia:			
Richmond	0	0	2
West Virginia:			
Charleston	0	0	2
Huntington	0	0	2
Louisiana:			
Shreveport	0	0	4
Oklahoma:			
Oklahoma City	0	0	1
Texas:			
Dallas	0	0	3
Montana:			
Great Falls	0	0	1
Colorado:			
Denver	0	0	1
New Mexico:			
Albuquerque	0	0	1
Utah:			
Salt Lake City	0	0	1
Washington:			
Seattle	0	0	3
Spokane	0	0	1
Tacoma	0	0	1
Oregon:			
Portland	0	0	1
California:			
Los Angeles	0	0	4

Encephalitis, epidemic or lethargic.—Cases: Rochester, 1; St. Louis, 1; Washington, 1; Atlanta, 1.

Pellagra.—Cases: Mobile, 1; Los Angeles, 2.

Typhus fever.—Cases: New York, 1; Charleston, S. C., 3; Savannah, 5; Tampa, 1; Birmingham, 1; Mobile, 3; New Orleans, 1; Dallas, 3; Houston, 1. Deaths: Savannah, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 24, 1940.—During the week ended August 24, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				4	4		1			9
Chickenpox		2		9	59	26	22	2	2	122
Diphtheria		1		13	2	3	1	5		25
Dysentery				1						1
Influenza					10				17	27
Measles		4		5	71	14	17	11	2	124
Mumps		2		1	28		1	3	2	37
Pneumonia		1			13			1	7	22
Poliomyelitis					5					5
Scarlet fever		2	1	43	31	13		4	6	100
Tuberculosis	1	21	16	66	77	3	2	2		188
Typhoid and paratyphoid fever			2	15	15					32
Whooping cough			4	194	72	15	41	4	6	336

CUBA

Provinces—Notifiable diseases—4 weeks ended August 17, 1940.—During the 4 weeks ended August 17, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2		1	9		9	21
Diphtheria		7		1		1	9
Hookworm disease		88				1	89
Leprosy	2	1					3
Malaria	11	1		3		20	35
Measles	4	1				3	8
Scarlet fever		1					1
Tuberculosis	26	25	20	45	18	37	171
Typhoid fever	20	104	14	39	37	45	259
Yaws						2	2

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FINLAND

Communicable diseases—4 weeks ended July 13, 1940.—During the 4 weeks ended July 13, 1940, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	234	Poliomyelitis	31
Dysentery	4	Scarlet fever	605
Influenza	1,463	Typhoid fever	19
Lethargic encephalitis	1	Undulant fever	1
Paratyphoid fever	188		

SCOTLAND

Vital statistics—Quarter ended June 30, 1940.—Following are vital statistics for Scotland for the quarter ended June 30, 1940:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	12,972	10.4	Deaths from—Continued.		
Births	23,285	18.6	Malaria	1	
Deaths	16,001	12.8	Measles	72	.06
Deaths under 1 year of age	1,568	[1] 67	Nephritis, acute and chronic	345	
Deaths from:			Pneumonia (all forms)	701	.56
Appendicitis	80		Poliomyelitis	1	
Cancer	2,005	1.60	Puerperal sepsis	10	
Cerebrospinal fever	138	.11	Scarlet fever	10	.01
Cerebral hemorrhage	1,099		Senility	530	
Cirrhosis of the liver	41		Suicide	106	
Diabetes mellitus	205		Syphilis	13	
Diarrhea and enteritis (under 2 years)	157		Tetanus	5	
Diphtheria	127	.10	Tuberculosis (all forms)	1,069	.85
Dysentery	10		Typhoid and paratyphoid fever	7	
Heart disease	3,635		Whooping cough	24	.02
Influenza	95	.08			
Lethargic encephalitis	29				

[1] Per 1,000 live births.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of September 27, 1940, pages 1796-1799. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China.—During the week ended September 21, 1940, cholera has been reported in China as follows: Hong Kong, 196 cases; Macao, 149 cases.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Area.—A rat found on September 11, and another found on September 12, 1940, near Paauhau, in Paauhau area, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

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Public Health Reports

VOLUME 55 OCTOBER 18, 1940 NUMBER 42

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

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CONTENTS

Public Health Reports

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THE HOUSING PROBLEM AS IT AFFECTS PUBLIC HEALTH NURSING ACTIVITIES

By Mary J. Dunn, *Public Health Nursing Consultant, United States Public Health Service*

To the extent to which there exists a housing problem in any community, be it urban or rural, to that extent do we find other grave and allied social, economic, and health problems, including particularly poor nutrition and inadequate medical and nursing care.

In other words, wherever there is poor housing we find not one, but multiple problems, all of which must be dealt with if we are to safeguard the health of the people and bring about community betterment; and this not as a charity but as the birthright of everyone in our democracy. The oft-repeated statement that "a third of our population lives in structures unfit for human habitation" must be accepted as a basic condition and regarded as a vital social challenge.

A great deal has been written and many facts and figures are available showing the extent of the relationship between housing and health, and as good citizens and as effective public health workers it is incumbent upon us to be thoroughly familiar with this information. All such reports conclude that those living under adverse housing conditions are subject to much ill health, and are handicapped by all the concomitants of low income.

It is also pointed out that while illness and death in slum areas cannot be attributed solely to housing conditions, there seems real justification for active participation of health authorities in the housing field.

Furthermore, it is the problem of housing poor people which to public health departments, and to others interested, is the most important of all; because without an attempt to better the situation of the lowest income group, there will be no permanent, substantial public health improvement.

Granted, then, that the housing problem is a concern of health authorities, it is the purpose of the writer to portray the role of the public health nurse in the program for better housing. As I see it, our major responsibilities, as nurses, are fourfold:

1. To have a working knowledge of the essentials of a healthful home environment.

2. To know the evils and handicaps of poor housing, particularly as they affect public health nursing performance.

3. To be informed regarding present-day programs and plans, Federal, State, and local, for better housing. To know particularly what our own organization is contributing.

4. To exert every influence to bring about improved housing conditions, to reduce overcrowding, and to encourage homemakers to maintain their homes and premises in a sanitary manner.

Let us now elaborate a bit more fully on the foregoing functions.

1. *To have a working knowledge of a healthful home environment.*—The essentials of such an environment should suggest:

A pure and sufficient water supply.

A safe milk and food supply.

Sanitary refuse and sewage disposal.

Sufficient ventilation, heat, and light.

Space enough for ordinary family demands.

Absence of excessive dampness.

Screening against flies and mosquitoes.

Protection against other insects and rodents.

Protection against fire hazards and other accident risks.

Adequate play space and sunshine for children.

Furthermore, a healthful environment must not be interpreted merely as one affording freedom from disease and the prevention of premature death, but should be associated with comfort, decency, convenience, and even joy in the daily routine. It is then that housing takes on far-reaching public health significance.

Relative to an elaboration of the basic principles of healthful housing, it is urged that we familiarize ourselves with the report on this subject of the Committee on the Hygiene of Housing of the American Public Health Association, which was published in preliminary form in the American Journal of Public Health for March 1938, page 351, and which has since been issued in revised pamphlet form.

2. *To know the evils and handicaps of poor housing, particularly as they affect public health nursing performance.*—When we speak of housing evils, it is with the realization of their existence not only in congested cities but on cotton plantations and in the mountains, in mining communities, in mill towns, and in farming regions, wherever people have congregated. What, then, are some of the major health hazards of bad housing? These evils seem to group themselves under the following categories:

(*a*) Lack of sanitation: Disease is spread all too frequently by such inadequate sanitary facilities as contaminated water supplies from wells, water polluted by improper plumbing, and insanitary toilets.

Likewise, the accumulation of refuse and water encourages the spread of insect-borne diseases, including malaria, in many regions

(*b*) Lack of light and sunshine: Lack of sunlight encourages the survival of disease germs and lessens human resistance to certain diseases. It is one of the chief causes of rickets in children With relation to the patient with advanced tuberculosis, the danger of infecting other members of the household is increased greatly if there are dark or badly lighted rooms, since the bacilli sprayed about by the coughing of the patient live, and consequently remain dangerous, much longer in darkened areas.

Lack of light and undue glare must be considered also with relation to eyestrain and accompanying eye defects.

(*c*) Overcrowding: Overcrowding, as pointed out in various studies, is a vital factor in the relation between housing and health The more closely people are crowded together in their homes, and more particularly in bedrooms and beds, the greater the danger of spreading infection throughout the family. This applies particularly to such diseases as the common cold, sore throat, bronchitis, influenza, diphtheria, scarlet fever, measles, mumps, chickenpox, whooping cough, pneumonia, and tuberculosis In addition to the foregoing, overcrowding, with little or no opportunity for privacy or comfort, increases family friction and nervous tensions with consequent ill results which cannot always be measured.

(*d*) Lack of screening: Absence of suitable screening is also accountable many times for the spread of disease, especially the insect-borne type.

(*e*) Lack of facilities for keeping milk and food from decomposition: Foods not properly cared for may propagate various bacteria which cause food poisoning.

(*f*) Poor construction and dilapidation: Poorly constructed, ramshackle buildings introduce all the hazards associated with accident, especially fire and accidental falls.

What effect may the foregoing hazards have upon our public health nursing performance? Surely, there is not a nurse, and more particularly a public health nurse, who could not cite example after example of ineffectiveness of her nursing performance because of extremely poor housing conditions and the accompanying problems, encountered in all too many of the homes visited daily in line of duty. While such adverse conditions are challenging, and they serve to test one's ability and ingenuity as a nurse and teacher, they interfere with proper and effective professional functioning and it must be recognized that certain accomplishments will never be attained until the people of every State in the Nation are afforded at least minimal standards for decent living. For example:

1. How can the nurse be practical in her instruction regarding isolation technique when several people, in addition to the patient, are occupying but one room?

2. What can she teach regarding the disposal of excreta when the premises are devoid of any semblance of a sanitary unit?

3. How effective can she make her teaching regarding the care of milk and other perishable food when there are no facilities for refrigeration?

4. What can she teach regarding sight conservation when the house is devoid of windows or adequate means of artificial lighting?

The foregoing, as well as other innumerable and comparable problems which might be cited, confront us daily, and I am confident that there is no one who would not agree that public health nursing, to be really effective, must have as its foundation decent standards of living. Otherwise, much of our time and energy will continue to be of little or no avail.

3 *To be intelligently informed regarding present-day programs for better housing.*—Other countries, including England, Austria, Holland, and Sweden, have long been active in developing adequate housing. Although housing for many years has also been a Nation-wide problem in the United States, we have only lately, as a Nation, begun to take remedial steps regarding it. Let us review briefly some of the developments in national housing programs of the past decade:

1. In 1931, President Hoover called a "President's Conference on Home Building and Home Ownership" in order to stimulate the building of new homes, and by so doing to provide work for the unemployed and more satisfactory housing facilities for the people in the low economic groups.

2. During the present administration the problem of housing has been attacked with increased vigor and for the same reasons.

(*a*) The Housing Division of the Public Works Administration began a program of replacing slum areas with low-rent housing of quality and decency.

(*b*) The Farm Security Administration has dealt with the development of rural communities beyond metropolitan limits, and with rehabilitation, including housing, of individual farmsteads.

(*c*) The Federal Home Loan Bank Board provides a central mortgage credit reserve, and through the Home Owners' Loan Corporation refinances existing mortgages of distressed home owners and makes reconditioning loans.

(*d*) The Federal Housing Administration has stimulated private institutions to make loans for the construction of new houses and modernization and repair of existing homes through partial insurance against losses.

(e) The United States Housing Authority makes loans and annual contributions to local housing authorities for slum clearance and housing of families of low income.

In addition to the foregoing national endeavors, innumerable State and local housing activities might also be mentioned. Reference has already been made to the American Public Health Association Committee on the Hygiene of Housing under the leadership of Dr. C.-E. A. Winslow.

Despite the method of attack, all are working toward the end that each family in the community may be housed in a dwelling that affords protection against the weather, adequate facilities for sanitation, safety, and for the general well-being (physical and psychological) of the individual members; a home that can be rented or purchased for a sum that will leave sufficient funds for food, clothing, and other essentials; a home located in a neighborhood that is free from influences that tend to undermine character and moral values.

That we, as public health nurses, should keep informed regarding these and similar movements for community and individual betterment, would appear not only highly desirable but wholly essential if we, as good citizens and effective public health workers, are to fulfill the fourth major responsibility set forth at the beginning of this paper.

4. *To exert every influence in bringing about better housing conditions, to reduce overcrowding, and to encourage homemakers to maintain their homes and premises in a sanitary condition.*—What are some of the concrete means that may serve in the attainment of this objective?

(a) Careful recording of all the pertinent facts on substandard conditions of environmental sanitation and housing, omitting no item relative to these factors on the individual and family record form.

(b) Reporting to other divisions of the health department, or other city departments concerned, gross evidences of poor sanitation, so that compulsory steps, if necessary, may be taken to improve the conditions.

(c) Establishing liaison relationships with local housing and welfare authorities to provide the housing authority with information regarding substandard physical housing conditions and to secure from welfare authorities assistance in ameliorating the substandard living conditions of the families with which the nurse is working.

(d) Instructing, when indicated, all families in ways and means of improving the sanitation of the home and its surroundings, and interpreting to the families the significance, from a health point of view, of maintaining the sanitary levels of the home.

(e) Advising the family in ways and means of minimizing the adverse effects of overcrowding.

(*f*) Securing assistance from social-welfare groups to instruct families in the techniques of good housekeeping practices. Such facilities as the Work Projects Administration housekeeping-aide projects, or other organized services, might be enlisted.

(*g*) Including in group and other teaching programs subjects which are designed to make the community, as well as each individual family, more "housing conscious."

(*h*) Increasing the emphasis in organized nursing circles on the necessity to think in terms of better housing and sanitation, not for any particular groups or areas, but for all groups and all areas, realizing that there are slum conditions in the country as well as in the city.

By observing the foregoing, a statement made by a State sanitation consultant to the effect that "a nurse can do more, perhaps, than anyone else to further sanitation in the home," should become a truism. This is a big order, but nurses have been given big orders before and have not been found wanting.

In conclusion, let us be reminded that as other social needs have brought about social action, so will this great need, the need for better housing, be met. And, in its accomplishment may our profession of nursing stand ready, as it always has in the past, to make its own unique contributions in ways already known to us, in the fulfillment of better housing facilities and improved standards of living for the people of our community, our State, and our Nation.

REFERENCES

Britten, Rollo: The relation between housing and health. Pub. Health Rep., 44: 1301 (Nov. 2, 1934). Reprint No. 1656.

Graves, L. M., and Fletcher, A. H.: Problems of a housing-enforcement program. Am. J. Pub. Health, 28: 695 (June 1938).

Basic Principles of Healthful Housing. Committee on the Hygiene of Housing. American Public Health Association. 2nd ed., May 1939.

The hygiene of housing (a symposium). The Commonhealth, Massachusetts Department of Public Health, 25: 95 184 (April-June 1938).

Wilson, M. L.: Rural housing. J. Home Economics, 31: 28 (January 1939).

Britten, Rollo H., Brown, J. E., and Altman, Isadore: Certain characteristics of urban housing and their relation to illness and accidents: Summary of findings of the National Health Survey. Milbank Memorial Fund Quarterly, 18: 91–113 (April 1940).

SANITARY AND PHYSIOLOGICAL ASPECTS OF FLOORING MATERIALS

By JOSEPH M. DALLAVALLE, *Passed Assistant Sanitary Engineer, National Institute of Health, United States Public Health Service*

In the light of our present knowledge, it is not possible to relate health to the kind of floor construction used in our homes. Some indirect evidence has been published, but it is questionable whether

such evidence can be considered specific or conclusive. Whenever an attempt is made to relate the elements of housing to health, it is found that the variables involved are so numerous and complex as to impede rational analysis. The aggregate of many coexisting factors may influence health, but it is doubtful whether any dominating influence can be attributed to one single item, as for example floors.

While it is difficult to relate flooring construction to health, there are certain sanitary and physiological implications which can be evaluated in terms of known physical properties of floor coverings. Thus, dustiness is associated with rate of wear or disintegration; fatigue may be measured in terms of resiliency; coldness by means of heat transmission coefficients; and noise in terms of acoustical properties. Table 1 lists these four items and their related indices.

TABLE 1.—*Physical measurements or indices related to certain sanitary and physiological aspects of flooring materials*

Sanitary or physiological item	Related measure or index	Units of measurement
Dustiness	Wear	Wear in inches made by accelerated test.
Fatigue	Resiliency	Initial indentation (30 seconds after application of load) in inches made by 25-pound load on a flat-ended rod ¼-inch in diameter.
Coldness	Heat transmission	B. T. U. per square foot of floor per hour.
Noise	Acoustical transmission	Transmission loss in decibels for sample floor panel.

The physical properties of flooring materials have been published and are readily available. However, so far as can be determined, no comprehensive treatment of these properties in terms of desirability from a sanitary or physiological point of view has ever been undertaken.

DUSTINESS

There is no evidence that floors constructed in accordance with the best accepted technique disintegrate sufficiently to be insanitary or troublesome. Emley and Hofer (*1*) have studied the relative wearing properties of industrial-type floor coverings used in post offices. The values of wear for different floor materials as obtained by these investigators are given in table 2.

The testing equipment used by Emley and Hofer consisted of two post-office trucks arranged in tandem, one loaded to 1,500 pounds and the other to 1,000 pounds. The floor material to be tested was placed on a circular track 40 feet in diameter. Both trucks were driven about the track at a speed of 2 miles per hour for 60,000 circuits. Dust and fragments were removed daily.

The results of these studies indicate that rubber tile and linoleum are most resistant to wear. Maple strips and blocks are next in order, followed by concrete (excepting concrete surfaced with 1:3 mortar).

End-grain southern yellow pine and end-grain Douglas fir appear to have poorer wearing properties than the materials mentioned.

TABLE 2.—*Wear of various flooring materials after 60,000 truck cycles*

Material	Wear (thirty-seconds of an inch)	Material	Wear (thirty-seconds of an inch)
1. Plain concrete	8	11. Edge-grain maple	2
2. Concrete with abrasive aggregate	8	12. Maple unit blocks	2
3. Concrete surfaced with 1:3 mortar	21	13. Maple strips, 4-coat finish	2
4. Concrete with liquid hardener	8	14. Maple strips, 2-coat finish	2
5. Concrete with metallic hardener	4	15. Maple strips, linseed-oil finish	2
6. Asphalt blocks	2	16. Magnesite with hardwood fiber	5
7. Asphalt plank	7	17. Plain magnesite	7
8. End-grain southern yellow pine	4	18. Linoleum	1
9. End-grain Douglas fir	4	19. Rubber sheet [1]	3
10. Quartersawed red oak	4	20. Rubber tile	1

[1] The sheet-rubber flooring was subjected to only 46,985 truck cycles.

Inspection of table 2 shows further that the wearing properties of concrete compare favorably with those of maple. In fact, after 60,000 truck cycles, there is but one thirty-second of an inch difference between the wear of concrete and maple. Later tests conducted by Sigler and Koerner (*2*) simulated more normal conditions of floor wear in households, but unfortunately omitted uncovered concrete. However, as in the previous tests, the order of resistance to wear was as follows: (1) Rubber tile, (2) linoleum, (3) wood (short strip maple), and (4) asphalt tile.

More extensive, although not comparable, tests on the wear of concrete surfaces have been conducted by Schuman and Tucker (*3*). Depending upon the mixture used, the values of wear ranged for one series of tests from 0.002 inch for the best mix to 0.019 inch for the poorest.[1] The tests developed by Schuman and Tucker are accelerated tests and hence are more severe than conditions to which concrete is subjected in the home. These investigators point out that the subsurface concrete is harder than the thin surface layer and that the wearing properties are improved. Quoting from the summary of the paper referred to:

1. For the same mix proportions, the wear resistance of concretes and mortars is greater for higher *C/W* ratios.* For equal *C/W* ratios, wear resistance increases with increasing proportion of aggregates up to a certain point, depending on the aggregates used, then decreases. Some mixes which had poor wear resistance at the surface were relatively more resistant after the surface "skin" was removed.

2. The shape of the aggregate particles (rounded or angular) affects the amount of water required for ease of placing and finishing, and thus may affect wear resistance of the concrete as much as the abrasion resistance of the particles themselves.

[1] The results were obtained by use of abrading steel disks rotating at a rate of 180 r. p. m. Each disk represented an area of 5.6 square inches loaded to 25 pounds. The tests in question were of 5 minutes' duration. For the usual mixes, the median value is 0.004 inch.

*Ratio of the weight of cement to weight of water.

3. In this investigation, delaying the troweling for 3 or more hours after placing the concrete tended to increase wear resistance, especially for mixes containing no coarse aggregate

4. The wear resistance of many mixes is greatly improved by troweling into the surfaces dust coats of cement, of cement and sand, or of cement and metallic aggregate. For example, the slab to which was applied a heavy dust coat consisting of a mixture of two parts of metallic aggregate to one of cement, by weight, had the highest wear resistance of all slabs tested. A dust coat also facilitates finishing the surface of concrete made of a lean mix, such as 1 : 3 : 6.

5. Concrete made with a "normal" portland cement and aged in the air without damp-curing may show comparatively poor wear resistance; but damp-curing may increase the wear resistance appreciably. Where a high-early-strength cement is used, the damp-curing is not as necessary.

6. Liquid surface treatments, such as solutions of magnesium fluosilicate or of water glass, are effective in improving the wear resistance of concrete that has not been damp-cured.

7. The use of coarse aggregates, such as gravel, permits reduction in the water content of the mixes and helps to reduce pitting. The use of dust coats containing cement also helps to reduce pitting, especially when applied to lean mixes.

From the evidence cited in the above paragraphs, it does not appear that materials used in floor construction, such as hard woods and concrete, when properly laid, differ greatly in their wearing and, hence, dust-producing properties. Dustiness directly attributable to floors is generally due to materials of poor quality or to faulty construction.

In passing, it may be mentioned that concrete flooring, when wet, is alkaline. Bacteria may therefore be more readily destroyed on such surfaces than those of other materials, although it must be pointed out that water used in washing is generally alkalinized by soaps or other detergents so as to be sufficiently effective.

COMFORT

The fatigue effects attributed to floors of various materials are not susceptible of direct measurement. Personal factors, such as activity performed, the kind of shoes worn, and weight of the individual, to mention only three, complicate the treatment of this subject. Moreover, it is possible to obtain only subjective reactions of persons exposed to different floor materials, and these may be biased by such factors as softness, attractiveness, and noise-producing qualities. Perhaps the only approach to an understanding of this problem is to compare the relative resiliencies of different materials The resiliencies may be regarded as indices of comfort, but no further inference should be drawn.

The measurements of resiliency cited in this paper are taken from tests of floor coverings made by the National Bureau of Standards (*4*). The basis of the measurements is derived by a special technique. Briefly, it comprises the use of a device which measures the indentation obtained in 30 seconds by means of a flat-ended pin, one-fourth

of an inch in diameter, carrying a 25-pound bearing load. This criterion is regarded as "an approximate measure of relative comfort value."[2]

It may be considered that the higher values of indentation give relatively a greater sensation of comfort. In this connection, it must be stressed that the indentation must be almost completely eliminated on the termination of the load; that is, the surface should recover to its previous state. This may be said to be the case with the types of floor coverings shown in table 3. The relative performances of floor coverings given in the table do not consider such properties as abrasive wear, effect of moisture, effect of aging, cost, ease of maintenance, resistance to tear and fracture, and similar items.

It is to be noted in table 3 that magnesium oxychloride and concrete finishes have the least amount of resiliency. However, the resiliencies of these finishes (derived from the technique previously mentioned) do not differ very much from the usual hard wood floors and asphalt. Both wood and concrete floors, without rugs or other coverings, are relatively less comfortable than linoleum, rubber tile, or cork composition coverings.

TABLE 3.—*Resiliency of various kinds of floor coverings as measured by the National Bureau of Standards technique (indentation at 30 seconds for load of 25 pounds on a flat-ended pin ¼ inch in diameter—0.001 inch)* (*4*)

Type of covering	Average thickness (inches)	Indentation (0.001 in.)	Type of covering	Average thickness (inches)	Indentation (0.001 in.)
Battleship linoleum (brown)[1]	0.190	16	Strip white oak	.783	1
Linoleum tile (marbleized)[1]	.125	9	Short strip maple	.796	½
Asphalt tile (black)	.135	2	Magnesium oxychloride[1]	.50	1
Sheet rubber (marbleized)	.127	5	Magnesium oxychloride[1]	.25	0
Rubber tile (marbleized)[1]	.190	8	Concrete topping (1:2 mix)[1]	1.00	½
Strip yellow pine	.789	2			

[1] Unpublished data supplied by P. A. Sigler, National Bureau of Standards.

The test results given in table 3 are based on samples with sub-floor equivalents which are absolutely rigid. A complete floor exhibits as a general rule greater resiliencies than those inferred from table 3. This follows from a consideration of load bending-moments of joists and beams upon which the complete floor is laid. From the data available, subject to the criterion used to determine comfort, it does not appear that concrete, asphalt, and hardwood floors possess markedly different properties of resiliency.

COLDNESS

The sensible heat loss experienced in connection with floor surfaces depends on the physical properties of the materials used, namely,

[2] The values of resiliency obtained are for materials mounted on an almost absolutely rigid base. Obviously, in practice, the "give" or "springiness" of the floor structure as a whole must be considered. Wood substructure, for example, "gives" better than steel or reinforced concrete.

heat conductance, specific heat, and smoothness. Materials such as concrete absorb heat at about twice the rate of wood. The kind of foot covering worn, however, reduces the rate of heat loss, and it is probable that at ordinary room temperatures the sensible heat loss is slight regardless of the floor surface considered. On the other hand, persons walking barefooted and small children playing on the floor will experience a marked sensation of coldness whenever the floor surface has a low specific heat and high conductivity.

Data pertaining to the heat conductivity of various types of floor construction have long been available (*5*). These data are used by engineers to calculate the heating requirements of homes and buildings. Unfortunately, data pertaining to the specific heats of various floor materials are more limited. Nor is the exact relation between conductance and specific heat known in order to determine the heat loss experienced from exposure to various floor surfaces. Some research is necessary before general qualitative conclusions can be made with regard to the physiological significance of the above-mentioned properties.

NOISE

The noise transmission properties of floors are a matter of much importance in multifamily dwellings. These noises are of two kinds: (*a*) Those due to conversation, and (*b*) noises communicated directly to the structure by walking, housekeeping, and the like. If materials are used in construction which are capable of transmitting a large amount of noise from within a given dwelling unit, the nuisance caused to other residents may reduce the desirability of the structure as a whole.

Chrisler and others (*6, 7*) have pointed out that the suitability of a floor or wall panel from the standpoint of transmission loss depends upon the amount of general noise in the locality in which it is used. For example, a partition may be quite satisfactory in a downtown district where the general noise level is high, but unsatisfactory in the country, where the reverse is true. The presence of street noises in the first instance has a masking effect. Hence, what is heard through a partition depends not only on its construction and the noise level in the adjacent room, but also on the amount of general noise in the locality.

The desirable noise level for apartments, hotels, and homes is below 40 decibels. Ordinary conversation in a room may approximate 60 decibels. Hence, to achieve a desirable noise level in adjacent rooms, partitions should have transmission losses greater than 45 decibels.

Data on noise transmission losses for various types of floor panels have been published by the National Bureau of Standards (*6, 7*). Some of these data are presented in table 4.

TABLE 4

Panel	Average transmission loss (in decibels)	Tapping	Panel	Average transmission loss (in decibels)	Tapping
129a	44.7	22.6	132c	52.6	17.1
129b	60.6	33.0	133a	51.6	15.3
129c	63.5	38.5	133b	53.7	20.2
129d	--------	37.4	134	28.3	−2.4
130	38.1	11.1	135	26.8	−2.9
131	45.4	11.6	136a	52.9	6.5
132a	53.3	19.4	136b	61.2	21.1
132b	52.8	--------	137	52.8	11.7

DESCRIPTION OF PANELS

129a. Combination floor panel constructed of 4 by 12 by 12-inch, 3-cell partition tile. The ceiling of this panel was finished with ½-inch of brown-coat gypsum plaster and a smooth white finish coat. The floor surface consisted of ¹³⁄₁₆-inch oak flooring, nailed to 2 by 2-inch nailing strips 16 inches on centers, which were grouted into the concrete.

129b. Same as 129a, except that United States Gypsum resilient steel clips were inserted between the concrete and nailing strips.

129c. Same as 129b, except that the oak flooring was removed, and ½-inch gypsum plaster board was attached to the nailing strips and 1½ inch Hydrocal was applied on top of the plaster board.

129d. Same as 129c, except that ¹³⁄₁₆-inch oak flooring was applied to the Hydrocal with a mastic cement.

130. Floor panel, 2 by 8-inch wood joist. Plaster on metal lath applied to lower side, subflooring and ¹³⁄₁₆-inch oak flooring to upper side.

131. Floor panel, 2 by 4-inch wood joist. Plaster on metal lath applied to lower side, subflooring and ¹³⁄₁₆-inch oak flooring to upper side.

132a. Floor panel, 2 by 8-inch wood joist. Plaster on metal lath applied to lower side, subflooring to upper side. 1-inch Balsam Wool was laid over the subfloor and on this were placed small squares (2½ by 2½ inches) of hard-pressed Nuwood spaced 16 inches on centers in each direction. Nailing strips 1¾ by 1¾ inches were placed on top of these Nuwood squares and held in place by a metal strap. The finish floor (¹³⁄₁₆-inch oak) was nailed on top of these nailing strips.

132b. This was a floor in an apartment house and supposed to be constructed the same as 132a.

132c. Floor panel. This panel was the same as 132a, except that ½ inch Balsam Wool was used instead of 1 inch.

133a. Floor panel, 2 by 8-inch wood joist. Plaster on metal lath applied to lower side, subflooring to upper side. ½-inch Balsam Wool was laid over subfloor and ½-inch Nuwood was placed on top of the Balsam Wool. 1¾ by 1¾ inch nailing strips were spaced 16 inches on centers on top of the Nuwood and held in position by driving one nail at each end through the strip and into the subfloor. A finish floor of ¹³⁄₁₆-inch oak was applied on top of the nailing strips.

133b. Floor panel. This panel was the same as 133a, except that strips of Nuwood 2½ inches wide were placed under the nailing strips, instead of entirely covering the ½-inch Balsam Wool with sheets of Nuwood.

134. Steel floor section with "Keystone section."

135. Steel floor section with flat top.

136a. Floor panel constructed by using steel section 135. The top of this section was covered with 2 inches of concrete and a suspended metal lath and plaster ceiling attached to the bottom, leaving approximately 4 inches between the metal section and plaster.

136b. Floor panel. This was the same as 136a, except that the 2-inch concrete slab was removed and ½ inch of emulsified asphalt applied directly to the top of the steel section. A 2-inch concrete slab was cast on top of this asphalt.

137. Floor panel constructed of 8-inch Mac Mar Joist, with 3-inch Thermax clipped on top and 1-inch Thermax clipped on bottom of joist. ½ inch of concrete was poured on top of the 3-inch Thermax. The floor was finished by cementing ¼-inch battleship linoleum on top of the concrete. The ceiling was finished by applying a brown coat of gypsum plaster and a smooth white finish coat.

The column marked "tapping" in table 4 gives the transmission loss for noise communicated directly to the test panel by a tapping device. In discussing the significance of the above series of tests, Chrisler and Snyder (7) comment as follows:

The results of these experiments give additional support to the statements published in previous papers* that when a wall or floor is more or less homogeneous it must be excessively heavy to be a good sound insulator. If, however, the wall or floor is built in layers which are as loosely connected together as possible, the sound-insulating properties will be greatly improved. This is illustrated by comparing panel 130 with panels 132a, 132b, or 132c. The essential difference between panel 130 and the others was that in 132a, 132b, and 132c, the finish floor was separated from the rest of the structure by a material which would yield a small amount and thus prevent an efficient transfer of energy from one part of the structure to the other. It should be noticed that this holds for both air-borne and tapping sounds. Similar results are shown by panels 129a, 129b, and 129c.

Panel 136a shows a decided improvement over panel 135 due to a hung ceiling and a 2-inch concrete floor slab. Panel 136b shows a still further improvement, especially for tapping noise, by separating the concrete slab from the steel section.

From the standpoint of noise transmission loss, as given in the second column of table 4, there do not appear to be very significant differences between the various types of construction listed. On the other hand, noises originating from impacts depend on the object creating the noise and the "yield" of the floor covering. Impact noises are more easily transmitted, as may be seen by reference to column 3 of the table, when the construction is a poor shock absorber.

DISCUSSION

The foregoing paragraphs indicate that floors constructed in accordance with the best accepted techniques possess only slight differences in physical properties. Complaints often made in regard to certain kinds of floors, with a few exceptions, can be attributed to poor design, materials, workmanship, or construction. The physical indices discussed in this paper are valuable as measures of sanitary, physiological, and even livability factors.

The problem of attitudes on the part of occupants is the most important item which at present seems to determine the choice of floor used. These attitudes are not limited to the physical properties of floors with which this paper is concerned, but with such matters as preconceived opinions and attractiveness. The solution of these aspects depends upon education of occupants to overcome preconceived ideas and the development of attractive treatments of floor surfaces by architects and engineers.

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*Bureau of Standards J. Research, 2: 541 (1929), RP48. Cir. Bureau of Standards 403 (June 23, 1933).

REFERENCES

(1) Emley, Warren E., and Hofer, Carl E.: Test of floor coverings for post-office workrooms. Research Paper RP1046, Journal of Research, National Bureau of Standards, 19:567–570 (1937).
(2) Sigler, Percy A., and Koerner, Elmer A.: Building materials and structures. Report BMS34. Performance test of floor coverings for use in low-cost housing: Part 1. National Bureau of Standards, Washington, 1940.
Sigler, Percy A., and Koerner, Elmer A.: Building materials and structures. Report BMS43. Performance test of floor coverings for use in low-cost housing: Part 2. National Bureau of Standards, Washington, 1940.
(3) Schuman, Louis, and Tucker, John, Jr.: A portable apparatus for determining the relative wear resistance of concrete floors. Journal of Research, National Bureau of Standards, 23:549–570 (1939).
(4) Sigler, Percy A., and Woodward, Myrtle B.: Building materials and structures. Report BMS14. Indentation and recovery of low-cost floor coverings. National Bureau of Standards, Washington, 1939.
(5) Guide. Amer. Soc. of Heat. and Vent. Engineers, 1936 edition, chapter 5. Published by the Society, 51 Madison Ave., New York, N. Y.
(6) Chrisler, V. L.: Building materials and structures. Report BMS17. Sound insulation of wall and floor constructions. National Bureau of Standards, Washington, 1939.
(7) Chrisler, V. L., and Snyder, Wilbert F.: Recent sound-transmission measurements at the National Bureau of Standards. Research Paper RP800, Journal of Research, National Bureau of Standards, 14:749–764 (1935).

STUDIES ON THE DURATION OF DISABLING SICKNESS

I. Duration of Disability from Sickness and Nonindustrial Injuries Among the Male and Female Memberships of 25 Industrial Sick Benefit Organizations, 1935–37, Inclusive [1]

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That there is a notable paucity of published material on the duration of disability from sickness and nonindustrial injuries among industrial workers is well known, particularly by those engaged in activities related to the protection and improvement of the health of the worker. Sufficient data, based on periodic reports from industrial sick benefit organizations, have accumulated in the Division of Industrial Hygiene of the National Institute of Health to make possible a substantial addition to the contributions of Keffer (*1*), Bassford (*2*), and Fitzhugh (*3*).

It is purposed to present the results of certain analyses in a series of papers, the first, the present one, to deal with the combined experiences of 25 industrial sick benefit organizations subscribing to waiting and maximum benefit periods of varying length. The results, based on all disabilities that lasted 8 calendar days or longer, will be shown specific for sex and for the 3 broad cause groups, respiratory diseases, nonrespiratory diseases, and nonindustrial injuries. The memberships are essentially white; their age distributions are not available.

[1] From the Division of Industrial Hygiene, National Institute of Health.

The analysis covers the 3 years, 1935–37, and only ended cases are included.

The second paper of the series will draw on the experiences of 8 industrial sick benefit organizations all subscribing to a maximum benefit period of 52 weeks.

THE SICK BENEFIT ORGANIZATIONS

The 25 sick benefit organizations comprised mutual sick benefit associations, group insurance plans, and company relief departments. All of the 25 organizations supplied data on males; the organizations were distributed geographically as follows: 5 in Pennsylvania, 4 in Illinois, 3 each in Connecticut, Massachusetts, and New York, 2 in Ohio, and 1 each in Maine, Minnesota, New Jersey, South Dakota, and Canada. Nineteen of the 25 organizations supplied data on females and these were located as follows: 5 in Pennsylvania, 3 each in Illinois and New York, 2 each in Connecticut and Ohio, and 1 each in Massachusetts, Maine, Minnesota, and New Jersey.

It should be recognized that data of the type used in this study have a number of inherent limitations which have been referred to in recent articles (*4–6*). Briefly these limitations, among others, have to do with whether membership was voluntary, with the exclusion from membership of employees under or above a certain age, the exclusion of persons with particular chronic diseases, and the exclusion of workers in certain occupations, or because of particular physical defects found at examination at the time of application for membership. While each sick benefit organization did not necessarily subscribe to all elements possibly imposing limitations on the data, nevertheless the memberships may be considered, to some extent, selected groups.

ANALYSIS OF THE DATA

Exposure by industry.—The data for the 3 years are based on records for 215,564 male years of life and 36,622 female years. These exposures may be conveniently classified according to industry as shown in the accompanying table. It will be observed that the public utilities rank first in both lists of percentages. In fact, this industry represents over 40 percent of the male exposure and almost one-quarter of the female exposure. Over 60 percent of the male exposure is accounted for by public utilities, and industries engaged in the making of cameras and photographic supplies, and plumbing fixtures, while approximately 70 percent of the female exposure is represented by public utilities, and industries producing cameras and photographic supplies, wearing apparel, and electric lamps.

Industry	Number		Percent	
	Male years	Female years	Male years	Female years
Total	215,564	36,622	100.0	100.0
Public utilities	89,597	8,689	41.6	23.7
Cameras and photographic supplies	22,065	6,094	10.2	16.6
Plumbing fixtures	21,640	1,977	10.0	5.4
Soap	17,970	2,336	8.3	6.4
Machinery	13,999	1,437	6.5	4.0
Iron and steel	10,757		5.0	
Wearing apparel	7,814	5,983	3.6	16.3
Metal mining	6,381		3.0	
Printing and publishing	5,480	1,990	2.5	5.4
Electric lamps	5,029	4,840	2.3	13.2
Time pieces	2,313	2,255	1.1	6.2
Miscellaneous	[1] 12,519	[2] 1,021	5.9	2.8

[1] Abrasives, chemicals, office furniture, paper, and paper novelties.
[2] Office furniture and paper.

Summary of basic data.—While only approximately 10 percent of the combined memberships of the 25 sick benefit organizations subscribed to waiting periods other than 7 days, the maximum benefit periods (including the waiting periods) ranged from 56 through 372 days.[3] Over one-half of the total male and female memberships, respectively, was subject to a maximum benefit period of 185 days and over. These facts, among others, are given in table 1. The table also shows, by sex and maximum benefit period, the number of cases and the number of days of disability arising therefrom. The 20,032 cases among males and the 5,362 cases among females are further shown by duration according to weekly intervals up to 99 days and thereafter to 372 days according to 13-week intervals. It will be observed that in the calculation of the two rates, frequency and disability, the combined memberships are appropriately reduced when the case duration exceeds a particular maximum benefit period. Thus, for the duration 50–56 days the membership for males is 215,564 years. The next duration, 57–63 days, is reduced to 208,352 years since one of the sick benefit organizations has a maximum benefit period (including the waiting period) of 56 days, and a membership representing the amount deducted, namely, 7,212 years. Of interest is the decrease in both rates as the duration increases, the rate for females being generally greater than the corresponding rate for males. The precipitous decline of the frequency rate during the first 4 weeks is clearly in evidence for both sexes.

[3] Three organizations subscribed to a maximum benefit period longer than 372 days; cases in these organizations lasting longer than 372 days were artificially terminated at 372 days.

TABLE 1.—*Summary of basic data, experience of members of 25 industrial sick benefit organizations, cases lasting 8 calendar days or longer due to sickness and nonindustrial injuries and ending during 1935–37, inclusive*

Duration of cases in calendar days [1]	Person-years of membership: Males	Person-years of membership: Females	Days of disability, Annual number per person: Males	Days of disability, Annual number per person: Females	Days of disability, Total number: Males	Days of disability, Total number: Females	Cases, Annual number per 1,000 persons: Males	Cases, Annual number per 1,000 persons: Females	Cases, Total number: Males	Cases, Total number: Females	Number of cases, Males, maximum benefit period in days (including the waiting period) [2]: 56	Males: 63	Males: 73–77	Males: 91 [3]	Males: 97–98	Males: 155–189	Males: 279	Males: 372	Females: 56	Females: 63	Females: 77	Females: 91 [3]	Females: 97	Females: 189	Females: 372
All durations	215,564	36,622			724,231	199,948	92.9	146.4	20,032	5,362	452	205	2,085	1,489	2,856	47,72	1,459	6,759	157	411	524	451	71	2,601	1,147
8–14	215,564	36,622	0.379	0.520	81,610	19,030	34.9	47.0	7,516	1,722	73	72	935	558	711	1,573	823	2,771	16	56	227	195	17	706	505
15–21	215,564	36,622	.275	.435	59,302	15,917	15.3	24.2	3,315	888	64	25	328	266	498	825	223	1,086	16	82	93	79	4	455	159
22–28	215,564	36,622	.222	.363	47,826	13,301	8.9	14.4	1,912	629	56	17	187	146	250	499	116	641	17	58	37	43	8	264	102
29–35	215,564	36,622	.210	.360	45,364	13,201	6.5	11.2	1,410	409	40	21	139	104	217	348	69	472	14	28	40	25	5	217	80
36–42	215,564	36,622	.192	.341	41,310	12,498	4.9	8.7	1,053	317	32	14	99	77	182	256	57	336	6	31	24	23	2	176	55
43–49	215,564	36,622	.179	.333	38,538	12,200	3.9	7.2	837	263	26	11	92	66	153	201	40	248	11	22	27	15	3	140	45
50–56	215,564	36,622	.129	.325	27,897	11,906	2.4	6.1	526	224	4	6	46	33	99	150	13	175	5	21	16	15	5	122	40
57–63	208,352	33,837	.146	.281	30,385	9,512	2.4	4.7	505	158		4	49	40	105	134	16	157		23	19	11	4	80	21
64–70	206,878	30,495	.102	.190	21,111	5,793	1.5	2.8	314	86			28	18	76	80	10	102			5	4	3	55	19
71–77	206,878	30,495	.101	.172	20,894	5,256	1.4	2.3	282	71			30	19	59	75	5	94			7	6	5	43	10
78–84	180,447	26,263	.080	.180	14,393	4,723	1.0	2.2	177	58				16	39	61	8	53				4	2	35	17
85–91	180,447	26,263	.098	.175	17,634	4,587	1.1	2.0	200	52				24	52	44	9	71				4	2	32	14
92–98	164,161	23,281	.080	.143	13,199	3,320	.8	1.5	139	35					28	62	3	46					1	25	9
99–189	126,013	22,831	.563	1.151	70,938	26,291	4.1	8.5	522	195						226	30	266						153	42
190–280	77,077	8,515	.275	.378	21,161	3,218	1.2	1.6	91	14							15	76							14
281–371	70,696	8,515	.331	.232	23,406	1,973	1.0	.7	70	6								70							6
Cases reaching maximum benefit					149,263	37,232	5.4	9.1	1,163	335	157	35	152	122	387	193	22	95	72	90	29	27	10	98	9
Person-years of membership	215,564	36,622									7,212	1,474	26,431	16,286	38,148	48,936	6,381	70,696	2,785	3,342	4,232	2,982	450	14,316	8,515
Days of disability					724,231	199,948					16,750	6,101	54,134	45,210	113,672	184,200	39,682	264,482	6,560	14,827	13,643	12,257	3,317	108,608	40,736
Number of organizations	25	19									1	2	4	4	2	5	1	6	1	2	2	4	1	4	5

[1] The number of days of disability is the number of calendar days from the date disability began to the date of return to work, or to the end of the maximum benefit period.
[2] Approximately 10 percent of the combined memberships subscribed to waiting periods other than 7 days.
[3] Maximum benefit period of 91 days, retroactive to first day.

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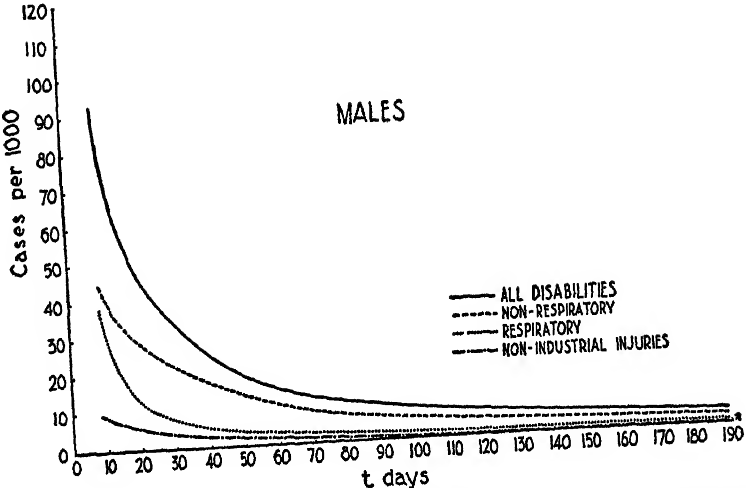

FIGURE 1A.—Annual number of cases per 1,000 MALES of sickness and nonindustrial injuries disabling for a specified number of days (*t*) or more, experience of male members of industrial sick benefit organizations, cases lasting 8 calendar days or longer and ending during 1935–37, inclusive.

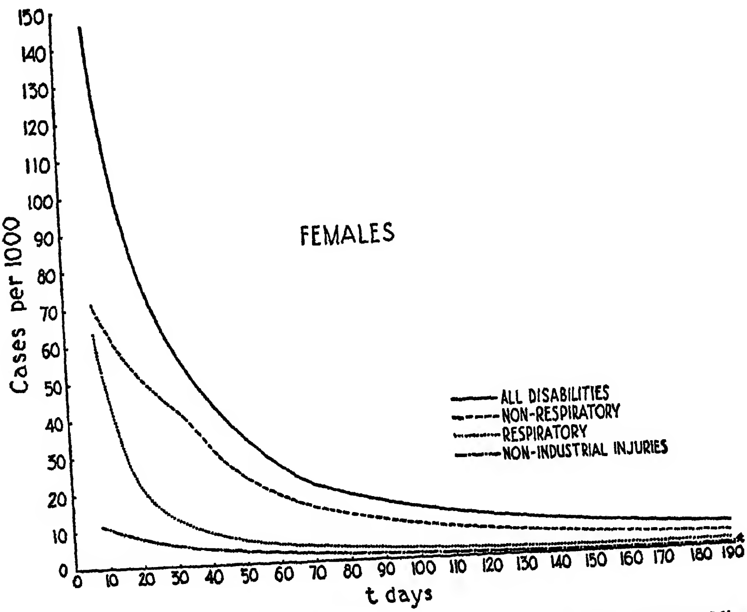

FIGURE 1B.—Annual number of cases per 1,000 FEMALES of sickness and nonindustrial injuries disabling for a specified number of days (*t*) or more, experience of female members of industrial sick benefit organizations, cases lasting 8 calendar days or longer and ending during 1935–37, inclusive.

Annual number of cases per 1,000 persons of sickness and nonindustrial injuries disabling for a specified number of days (t) or more.—Table 2 presents the pertinent data by sex and broad cause group. The frequencies are shown graphically (through 190 days) in figures 1A and 1B. It will be observed that the rates for the females are generally higher than the corresponding ones for the males, and that the nonrespiratory group of causes presents for both sexes the highest frequency of cases lasting 8 days and longer. All of the frequencies decline gradually, moving relatively rapidly during the early days of disability. The rapidity of decline of the different frequencies is of considerable interest. The nonrespiratory group declines most slowly; this group is followed by the nonindustrial injuries, and then by the respiratory group which declines most rapidly. With respect to each cause group the frequencies for the females decline more slowly than those for the males. The rapidity of decline may be viewed quantitatively by ascertaining the day (t) after onset of disability when the frequencies of cases disabling t days or more are approximately one-half of the corresponding initial frequencies. Thus, for the nonrespiratory group the initial frequency for males and females is approximately halved on the twenty-eighth day and during the fifth week, respectively; for nonindustrial injuries the corresponding figures are the twenty-third and twenty-sixth days, and for respiratory diseases, the fourteenth and fifteenth days. All of these observations reflect the relative magnitude of the length of the cases characterizing the different cause groups.

Annual number of days of disability per person resulting from all disabilities contributing t days or less.—Table 3 presents the data by sex and broad cause group. The days of disability do not include those arising from cases of less than 8 days in duration nor from fatal cases which terminated in death prior to the eighth day of disability. Figure 2 shows the material graphically. It should be observed that the horizontal axis which carries a logarithmic scale may be viewed as an axis of maximum benefit periods.[8] For example, the average annual number of days of disability per person corresponding to a maximum benefit period of 53 weeks is 3.9 for males and 6.2 for females. Disability rates, specific for sex and broad cause group, may therefore be determined graphically for a maximum benefit period of any length up to 53 weeks. The figure thus shows the effect on the disability rate of changes in the length of the maximum benefit period.

[8] The reader is reminded that "maximum benefit period" here includes a waiting period of 7 days

Table 2.—*Annual number of cases per 1,000 persons, by sex and broad cause group, of sickness and nonindustrial injuries disabling for a specified number of days (t) or more, experience of members of industrial sick benefit organizations, cases lasting 8 calendar days or longer and ending during 1935–37, inclusive*

t days	Annual number of cases per 1,000 persons disabling for t days or more								Number of cases disabling for t days or more							
	All sickness and nonindustrial injuries		Nonindustrial injuries		Respiratory diseases		Nonrespiratory diseases		All sickness and nonindustrial injuries		Nonindustrial injuries		Respiratory diseases		Nonrespiratory diseases	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
8	92.9	146.4	9.7	12.0	38.2	63.0	45.0	71.4	20,032	5,362	2,080	440	8,245	2,307	9,707	2,615
9	87.2	139.9	9.2	11.5	34.8	59.0	43.2	69.4	18,806	5,125	1,992	423	7,493	2,161	9,321	2,541
10	81.6	133.8	8.8	11.1	31.3	54.8	41.5	67.9	17,583	4,899	1,901	406	6,747	2,008	8,935	2,485
11	76.4	126.1	8.3	10.7	28.3	49.7	39.8	65.7	16,470	4,618	1,802	391	6,095	1,821	8,573	2,406
12	71.9	120.0	8.1	10.4	25.6	45.7	38.2	63.9	15,494	4,393	1,736	380	5,526	1,672	8,232	2,341
13	67.5	113.3	7.8	10.0	23.0	41.2	36.7	62.1	14,547	4,151	1,679	366	4,963	1,511	7,905	2,274
14	63.5	106.7	7.4	9.5	20.8	37.2	35.3	60.0	13,678	3,908	1,596	349	4,475	1,363	7,607	2,196
15	58.0	99.4	6.9	9.1	17.9	32.2	33.2	58.1	12,516	3,640	1,488	331	3,867	1,180	7,161	2,129
16	55.3	95.5	6.5	8.8	16.6	29.7	32.2	57.0	11,912	3,496	1,405	320	3,559	1,088	6,948	2,088
17	52.9	91.4	6.2	8.3	15.3	27.2	31.4	55.9	11,414	3,347	1,343	304	3,308	995	6,763	2,048
18	50.9	88.3	6.1	8.0	14.3	25.5	30.5	54.8	10,962	3,232	1,301	291	3,076	934	6,585	2,007
19	49.0	85.3	5.8	7.8	13.4	23.8	29.8	53.7	10,555	3,125	1,241	285	2,899	874	6,415	1,966
20	47.2	82.4	5.5	7.5	12.8	22.1	28.9	52.8	10,176	3,019	1,187	276	2,750	810	6,239	1,933
21	45.3	78.9	5.4	7.2	11.9	20.3	28.0	51.4	9,764	2,890	1,156	263	2,567	744	6,041	1,883
22	42.7	75.1	5.0	6.8	11.0	18.4	26.7	49.9	9,201	2,752	1,084	248	2,357	676	5,760	1,828
23	41.2	73.3	4.8	6.6	10.3	17.6	26.1	49.1	8,892	2,683	1,044	242	2,230	642	5,618	1,799
24	39.9	70.9	4.7	6.4	9.9	16.5	25.3	48.0	8,612	2,597	1,018	234	2,137	606	5,457	1,757
25	38.8	69.1	4.6	6.2	9.5	15.8	24.7	47.1	8,348	2,529	989	227	2,051	577	5,308	1,725
26	37.7	67.3	4.5	6.0	9.1	15.1	24.1	46.2	8,136	2,466	963	221	1,969	553	5,204	1,692
27	36.5	65.6	4.3	5.7	8.7	14.5	23.5	45.4	7,875	2,403	933	210	1,877	529	5,065	1,664
28	35.4	63.4	4.2	5.5	8.3	13.5	22.9	44.4	7,633	2,323	907	201	1,780	496	4,946	1,626
35	28.6	51.6	3.4	4.7	6.2	9.9	19.0	37.0	6,160	1,889	729	171	1,327	363	4,104	1,355
42	23.4	42.7	2.8	4.1	4.9	8.1	15.7	30.5	5,043	1,562	591	149	1,060	296	3,392	1,117
49	19.2	35.3	2.2	3.4	4.0	6.5	13.0	25.4	4,144	1,292	475	122	861	239	2,808	931
56	16.5	28.5	1.8	2.8	3.4	5.4	11.3	20.3	3,552	1,042	396	103	729	196	2,427	743
63	13.9	23.7	1.4	2.3	2.9	4.6	9.6	16.8	2,888	801	294	77	601	155	1,993	569
70	12.1	20.4	1.2	1.7	2.5	4.0	8.4	14.7	2,508	621	247	52	514	121	1,747	448
77	10.7	17.9	1.0	1.6	2.2	3.5	7.5	12.8	2,211	545	208	48	451	106	1,552	391
84	10.4	17.4	.9	1.6	2.1	3.3	7.4	12.5	1,873	457	163	43	385	86	1,325	328
91	9.2	15.3	.7	1.5	1.9	2.9	6.6	10.9	1,671	403	133	40	342	76	1,196	287
98	8.6	14.4	.7	1.2	1.8	2.8	6.1	10.4	1,403	335	110	27	293	66	997	242
105	7.4	13.1	.6	1.1	1.7	2.6	5.1	9.4	927	298	75	25	209	59	643	214
112	6.8	11.8	.6	1.0	1.5	2.5	4.7	8.3	858	269	74	23	191	57	593	189
119	6.4	10.8	.6	.8	1.4	2.3	4.4	7.7	805	246	70	18	181	52	554	176
126	6.0	9.9	.5	.7	1.4	2.2	4.1	7.0	760	225	63	16	177	50	520	159

133	5.7	9.2	.5	.6	1.3	2.0	3.9	6.6	716	211	56	13	166	46	494	152
140	5.5	8.6	.4	.6	1.3	1.9	3.8	6.1	687	197	51	13	161	44	475	140
147	5.2	8.4	.4	.6	1.2	1.9	3.6	5.9	655	192	47	13	154	44	454	135
154	4.9	7.9	.3	.5	1.2	1.9	3.4	5.5	621	181	40	12	148	43	433	126
161	4.7	7.5	.3	.5	1.1	1.8	3.3	5.2	589	171	37	11	142	41	410	119
168	4.5	7.0	.3	.5	1.1	1.6	3.1	4.9	569	160	35	11	140	36	394	113
175	4.3	6.8	.3	.5	1.1	1.5	2.9	4.8	547	155	34	11	138	35	375	109
182	4.2	6.4	.3	.4	1.1	1.5	2.8	4.5	523	146	33	9	134	34	356	103
189	3.7	5.7	.2	.4	.9	1.4	2.6	3.9	471	129	30	8	119	31	322	90
196	3.5	3.3	.2	.2	.9	.5	2.4	2.6	272	28	21	2	74	4	177	22
203	3.4	3.2	.2	.2	.9	.5	2.3	2.5	253	27	19	2	70	4	174	21
210	3.3	3.2	.2	.2	.9	.5	2.2	2.5	258	27	19	2	69	4	170	21
217	3.3	2.8	.2	.1	.9	.5	2.2	2.2	251	24	19	1	67	4	165	19
224	3.1	2.6	.2	.1	.8	.5	2.1	2.0	242	22	18	1	66	4	158	17
231	3.0	2.5	.2	.1	.8	.5	2.0	1.9	233	21	18	1	62	4	153	16
238	2.9	2.3	.2	.1	.8	.5	1.9	1.7	225	20	16	1	61	4	148	15
245	2.8	2.2	.2	.1	.8	.5	1.8	1.6	218	19	15	1	60	4	143	14
252	2.7	2.1	.2	.1	.7	.5	1.8	1.5	211	18	15	1	57	4	139	13
259	2.7	2.0	.2	.1	.7	.5	1.8	1.4	206	17	15	1	57	4	134	12
266	2.6	2.0	.2	.1	.7	.5	1.7	1.4	201	17	15	1	57	4	129	12
273	2.5	1.9	.2	.1	.7	.4	1.6	1.4	196	16	15	1	57	3	124	12
280	2.2	1.8	.2	.1	.6	.4	1.4	1.3	163	15	14	1	44	3	108	11
287	2.2	1.6	.2	.1	.6	2	1.4	1.3	161	14	13	1	43	2	105	11
294	2.2	1.6	.2	.1	.6	.2	1.4	1.3	155	14	12	1	43	2	100	11
301	2.2	1.6	.2	.1	.6	.2	1.4	1.3	151	14	11	1	43	2	97	11
308	2.1	1.6	.2	.1	.6	.2	1.3	1.3	147	14	11	1	41	2	95	11
315	2.1	1.6	.2	.1	.6	.2	1.3	1.3	141	14	11	1	41	2	89	11
322	2.0	1.5	.2	.1	.6	.1	1.2	1.3	140	13	11	1	40	1	89	11
329	1.9	1.5	.2	.1	.5	.1	1.2	1.3	137	13	11	1	39	1	87	11
336	1.9	1.3	.2	0	.5	.1	1.2	1.2	132	11	10	0	39	1	83	10
343	1.8	1.3	.2	0	.5	.1	1.1	1.2	128	11	10	0	38	1	80	10
350	1.8	1.2	.2	0	.5	.1	1.1	1.2	126	10	10	0	38	1	78	9
357	1.7	1.1	.1	0	.5	.1	1.1	1.0	122	9	9	0	36	1	77	8
364	1.7	1.1	.1	0	.5	.1	1.1	1.0	118	9	9	0	34	1	75	8
371	1.4	1.1	.1	0	.4	.1	.9	1.0	97	9	7	0	30	1	60	8
372	1.3	1.1	.1	0	.4	.1	.8	1.0	95	9	7	0	30	1	58	8

NOTE.—The durations of all disabilities include the first 7 days of disability.

TABLE 3.—*Annual number of days of disability per person, by sex and broad cause group, resulting from all disabilities contributing t days or less, experience of members of industrial sick benefit organizations, cases lasting 8 calendar days or longer due to sickness and nonindustrial injuries, and ending during 1935–37, inclusive*

t days	Annual number of days of disability per person resulting from all disabilities contributing *t* days or less								Number of days of disability resulting from all disabilities contributing *t* days or less							
	All sickness and nonindustrial injuries		Nonindustrial injuries		Respiratory diseases		Nonrespiratory diseases		All sickness and nonindustrial injuries		Nonindustrial injuries		Respiratory diseases		Nonrespiratory diseases	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
8	0.743	1.171	0.077	0.096	0.306	0.504	0.360	0.571	160,256	42,896	16,640	3,520	65,960	18,456	77,656	20,920
9	.831	1.311	.086	.108	.341	.563	.404	.640	179,062	48,021	18,632	3,943	73,453	20,617	86,977	23,461
10	.912	1.445	.095	.119	.372	.618	.445	.708	196,645	52,920	20,533	4,349	80,200	22,625	95,912	25,946
11	.989	1.571	.104	.129	.400	.668	.485	.774	213,115	57,538	22,335	4,740	86,295	24,446	104,485	28,352
12	1.061	1.691	.112	.140	.426	.713	.523	.838	228,609	61,931	24,071	5,120	91,821	26,118	112,717	30,693
13	1.128	1.804	.119	.150	.449	.754	.560	.900	243,156	66,082	25,750	5,486	96,784	27,629	120,622	32,967
14	1.191	1.911	.127	.159	.469	.792	.595	.960	256,834	69,990	27,346	5,835	101,259	28,992	128,229	35,163
15	1.250	2.010	.134	.168	.488	.824	.628	1.018	269,350	73,630	28,834	6,166	105,126	30,172	135,390	37,292
16	1.305	2.106	.140	.177	.504	.854	.661	1.075	281,262	77,126	30,239	6,486	108,685	31,260	142,338	39,380
17	1.358	2.197	.146	.185	.520	.881	.692	1.131	292,676	80,473	31,582	6,790	111,993	32,255	149,101	41,428
18	1.409	2.286	.153	.194	.534	.906	.722	1.186	303,638	83,705	32,883	7,081	115,069	33,189	155,686	43,435
19	1.458	2.371	.159	.201	.547	.930	.752	1.240	314,193	86,830	34,124	7,366	117,968	34,063	162,101	45,401
20	1.505	2.453	.164	.209	.560	.952	.781	1.292	324,369	89,849	35,311	7,642	120,718	34,873	168,340	47,334
21	1.550	2.532	.169	.216	.572	.972	.809	1.344	334,133	92,739	36,467	7,905	123,285	35,617	174,381	49,217
22	1.593	2.607	.174	.222	.583	.991	.836	1.394	343,334	95,491	37,551	8,153	125,642	36,293	180,141	51,046
23	1.634	2.681	.179	.229	.593	1.009	.862	1.443	352,226	98,174	38,595	8,395	127,872	36,935	185,759	52,844
24	1.674	2.752	.184	.236	.603	1.025	.887	1.491	360,838	100,771	39,613	8,629	130,009	37,541	191,216	54,601
25	1.713	2.821	.188	.242	.613	1.041	.912	1.538	369,186	103,300	40,602	8,856	132,060	38,118	196,524	56,326
26	1.750	2.888	.193	.248	.621	1.056	.936	1.584	377,322	105,766	41,565	9,077	134,029	38,671	201,728	58,018
27	1.787	2.954	.197	.254	.631	1.070	.959	1.630	385,197	108,169	42,498	9,287	135,906	39,200	206,793	59,682
28	1.822	3.017	.202	.259	.639	1.084	.981	1.674	392,830	110,492	43,405	9,488	137,686	39,696	211,739	61,308
35	2.040	3.411	.228	.292	.687	1.164	1.125	1.955	439,867	124,939	48,998	10,758	148,128	42,575	242,741	71,606
42	2.218	3.736	.249	.322	.725	1.226	1.244	2.188	478,104	136,821	53,452	11,865	156,244	44,827	268,408	80,129
49	2.363	4.003	.266	.347	.755	1.276	1.342	2.380	509,411	146,613	57,038	12,804	162,822	46,650	289,551	87,159
56	2.485	4.221	.280	.368	.780	1.317	1.425	2.536	535,775	154,613	60,008	13,573	168,222	48,168	307,545	92,872
63	2.589	4.402	.291	.386	.801	1.352	1.497	2.664	557,487	160,737	62,245	14,173	172,706	49,346	322,536	97,218
70	2.678	4.553	.300	.399	.819	1.382	1.559	2.772	575,980	165,340	64,100	14,573	176,528	50,247	335,352	100,520
77	2.757	4.685	.308	.410	.835	1.408	1.614	2.867	592,292	169,357	65.665	14,919	179,860	51,033	346,767	103,405
84	2.833	4.814	.315	.421	.851	1.433	1.667	2.960	605,943	172,736	66,865	15,221	182,681	51,673	356,397	105,842
91	2.901	4.927	.321	.432	.864	1.454	1.716	3.041	618,264	175,713	67,892	15,505	185,193	52,236	365,179	107,972
98	2.961	5.032	.326	.441	.877	1.474	1.758	3.117	628,093	178,162	68,682	15,712	187,283	52,708	372,128	109,742
105	3.014	5.127	.330	.449	.889	1.492	1.795	3.186	634,794	180,336	69,223	15,898	188,780	53,130	376,791	111,308
112	3.063	5.215	.334	.457	.900	1.510	1.829	3.248	640,996	182,338	69,742	16,070	190,176	53,534	381,078	112,734

119	3.109	5.294	.338	.463	.910	1.527	1.861	3.304	646,775	184,150	70,244	16,211	191,482	53,919	385,049	114,020
126	3.152	5.366	.342	.468	.920	1.543	1.890	3.355	652,231	185,796	70,701	16,330	192,732	54,278	388,798	115,188
133	3.193	5.432	.345	.472	.930	1.558	1.918	3.402	657,372	187,311	71,111	16,428	193,926	54,615	392,335	116,268
140	3.232	5.494	.348	.476	.939	1.571	1.945	3.447	662,258	188;732	71,486	16,519	195,069	54,924	395,703	117,289
147	3.269	5.553	.351	.480	.948	1.584	1.970	3.489	666,942	190,031	71,828	16,610	196,162	55,232	398,952	118,239
154	3.304	5.610	.353	.484	.956	1.597	1.995	3.529	671,407	191,378	72,128	16,695	197,224	55,537	402,055	119,146
161	3.337	5.664	.355	.488	.964	1.610	2.018	3.566	675,604	192,605	72,392	16,777	198,228	55,823	404,984	120,000
168	3.369	5.715	.357	.491	.972	1.622	2.040	3.602	679,645	193,770	72,648	16,854	199,217	56,096	407,780	120,820
175	3.400	5.763	.359	.494	.980	1.633	2.061	3.636	683,535	194,868	72,892	16,931	200,188	56,344	410,455	121,593
182	3.430	5.809	.361	.497	.988	1.644	2.081	3.668	687,289	195,914	73,129	16,997	201,141	56,588	413,019	122,329
189	3.457	5.852	.363	.500	.995	1.654	2.099	3.698	690,728	196,890	73,350	17,058	202,000	56,813	415,378	123,019
196	3.482	5.875	.365	.502	1.002	1.657	2.115	3.716	692,654	197,087	73,497	17,072	202,528	56,841	416,629	123,174
203	3.506	5.897	.367	.504	1.008	1.660	2.131	3.733	694,514	197,278	73,630	17,086	203,025	56,869	417,859	123,323
210	3.530	5.919	.369	.506	1.014	1.663	2.147	3.750	696,336	197,467	73,763	17,100	203,511	56,897	419,062	123,470
217	3.553	5.941	.371	.508	1.020	1.666	2.162	3.767	698,106	197,652	73,896	17,113	203,982	56,925	420,228	123,614
224	3.575	5.960	.373	.509	1.026	1.669	2.176	3.782	699,822	197,811	74,027	17,120	204,447	56,953	421,348	123,738
231	3.596	5.977	.375	.510	1.031	1.672	2.190	3.795	701,478	197,959	74,153	17,127	204,890	56,981	422,435	123,851
238	3.617	5.994	.377	.511	1.036	1.675	2.204	3.808	703,078	198,101	74,274	17,134	205,322	57,009	423,482	123,958
245	3.637	6.010	.379	.512	1.041	1.678	2.217	3.820	704,625	198,237	74,379	17,141	205,748	57,037	424,498	124,059
252	3.656	6.025	.380	.513	1.046	1.681	2.230	3.831	706,115	198,368	74,484	17,148	206,151	57,065	425,480	124,155
259	3.675	6.039	.381	.514	1.051	1.684	2.243	3.841	707,566	198,491	74,589	17,155	206,550	57,093	426,427	124,243
266	3.693	6.053	.382	.515	1.056	1.687	2.255	3.851	708,989	198,610	74,694	17,162	206,949	57,121	427,346	124,327
273	3.711	6.066	.383	.516	1.061	1.689	2.267	3.861	710,372	198,722	74,799	17,169	207,348	57,142	428,225	124,411
280	3.728	6.078	.384	.517	1.066	1.691	2.278	3.870	711,685	198,827	74,903	17,176	207,732	57,163	429,050	124,488
287	3.744	6.090	.385	.518	1.070	1.693	2.289	3.879	712,827	198,931	74,999	17,183	208,033	57,183	429,795	124,565
294	3.760	6.102	.386	.519	1.074	1.695	2.300	3.888	713,932	199,029	75,084	17,190	208,334	57,197	430,514	124,642
301	3.775	6.114	.387	.520	1.078	1.697	2.310	3.897	715,002	199,127	75,166	17,197	208,635	57,211	431,201	124,719
308	3.790	6.126	.388	.521	1.082	1.699	2.320	3.906	716,046	199,225	75,243	17,204	208,928	57,225	431,875	124,796
315	3.804	6.138	.389	.522	1.086	1.701	2.329	3.915	717,048	199,323	75,320	17,211	209,215	57,239	432,513	124,873
322	3.818	6.149	.390	.523	1.090	1.702	2.338	3.924	718,029	199,419	75,397	17,218	209,496	57,251	433,136	124,950
329	3.832	6.160	.391	.524	1.094	1.703	2.347	3.933	718,994	199,510	75,474	17,225	209,769	57,258	433,751	125,027
336	3.845	6.170	.392	.524	1.098	1.704	2.355	3.942	719,926	199,596	75,544	17,229	210,042	57,265	434,340	125,102
343	3.858	6.179	.393	.524	1.102	1.705	2.363	3.950	720,835	199,673	75,614	17,229	210,309	57,272	434,912	125,172
350	3.870	6.187	.394	.524	1.106	1.706	2.370	3.957	721,717	199,746	75,684	17,229	210,575	57,279	435,458	125,238
357	3.882	6.195	.395	.524	1.110	1.707	2.377	3.964	722,585	199,813	75,753	17,229	210,832	57,286	436,000	125,298
364	3.894	6.202	.396	.524	1.114	1.708	2.384	3.970	723,424	199,876	75,816	17,229	211,075	57,293	436,533	125,354
371	3.904	6.209	.397	.524	1.117	1.709	2.390	3.976	724,136	199,939	75,870	17,229	211,292	57,300	436,974	125,410
372	3.905	6.210	.397	.524	1.117	1.709	2.391	3.977	724,231	199,948	75,877	17,229	211,322	57,301	437,032	125,418

NOTE: The durations of all disabilities include the first 7 days of disability.

Moreover the figure reveals that the rates for females are consistently higher than the corresponding ones for males. With respect to the rate of increase of all sickness and nonindustrial injuries it appears that the disability rate for females increases more rapidly than for males, the same holding for the nonrespiratory group of causes and to a lesser degree for the respiratory group. The nonindustrial

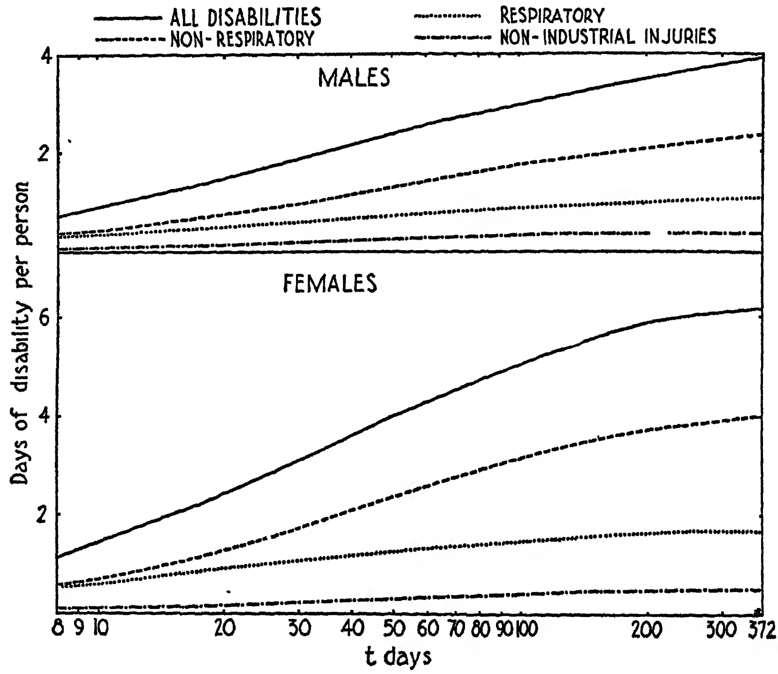

FIGURE 2.—Annual number of days of disability per person resulting from all disabilities contributing *t* days or less, experience of members of industrial sick benefit organizations, cases lasting 8 calendar days or longer due to sickness and nonindustrial injuries and ending during 1935-37, inclusive. (Logarithmic horizontal scale.)

injuries, on the other hand, show male and female disability rates that move approximately in parallel.

Of interest also is the fact that the male curve representing all sickness and nonindustrial injuries shows rates that approximate in magnitude the corresponding ones carried by the female curve of the nonrespiratory group, indicating that if the females suffered only nonrespiratory diseases their disability rates for different maximum benefit periods would approximate the corresponding disability rates covering all sickness and nonindustrial injuries among the males.

Further examination of figure 2 reveals that as the maximum benefit period becomes longer the difference between the rates for the nonrespiratory and respiratory groups becomes larger, the former, in the instance of the males, being twice the latter for a maximum

benefit period of 14 weeks; the corresponding maximum benefit period for the females is 9 weeks.

Finally, it will be observed that the extension of a maximum benefit period of 14 weeks to one of 53 weeks results in an increase of the disability rate for males and females of about 30 percent and less than 25 percent, respectively.

SUMMARY

This, the first of a series of papers on the duration of disabling sickness and nonindustrial injuries, based on cases lasting 8 days or longer, reported periodically by 25 industrial sick benefit organizations over a period of 3 years, presents principally 2 basic tables showing industrial morbidity by sex and broad cause group. One table gives the average annual number of cases per 1,000 persons causing disability for a specified number of days (*t*) or more, and the other, the average annual number of days of disability per person resulting from all disabilities contributing *t* days or less, the *t* in both instances varying from 8 through 372 days.

REFERENCES

(*1*) Keffer, R.: Group sickness and accident insurance. Trans. Actuarial Soc. Am., 28: 5–34 (May 1927).
(*2*) Bassford, H. R.: Discussion of paper cited in reference *1*. Trans. Actuarial Soc. Am., 28: 264–275 (October 1927).
(*3*) Fitzhugh, G. W.: Recent morbidity upon lives insured under group accident and health policies and premiums based thereon. Trans. Actuarial Soc. Am., 38: 354–383 (October 1937).
(*4*) Sayers, R. R., Kroeger, Gertrud, and Gafafer, W. M.: General aspects and functions of the sick benefit organization. Pub. Health Rep., 52: 1563–1580 (November 5, 1937).
(*5*) Gafafer, W. M.: Frequency of sickness and nonindustrial accidents causing disability lasting eight calendar days or longer among 60,000 white male railroad employees, 1930–34, inclusive. Pub. Health Rep., 53: 555–573 (April 15, 1938).
(*6*) Gafafer, W. M.: The course of disabling morbidity among industrial workers, 1921–38. Indust. Med., 9: 55–61 (February 1940).

RHEUMATIC FEVER IN NEW HAVEN, CONN.[1]

A SURVEY OF RECENT HOSPITAL ADMISSIONS

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This report is one of a series attempting to determine the prevalence of rheumatic fever and rheumatic heart disease in New Haven, Conn. These conditions are not reportable in New Haven (or for that matter in the majority of cities in the United States) and so it has been necessary to turn to another of the methods at present available for measuring their prevalence within a given community. Three of these other methods are: (*a*) Analyses of local hospital admission

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rates for rheumatic fever (*1*, *2*); (*b*) determinations of the local prevalence of rheumatic heart disease in school children (*3*, *4*); and (*c*) analyses of local mortality statistics (*5*). None of them is ideal and it is probable that all three methods should be employed in one location, if it is desired to arrive at an estimate of their relative or composite worth. And it is with this particular end in mind that the first of these three methods has been applied in this study in the city of New Haven. The data thus obtained, besides being of some value in themselves, should supplement information on the prevalence of rheumatic heart disease which has been previously obtained among the school children in this city (*3*).

The use of hospital admission rates as a measure of the local frequency of one particular disease is an old procedure but not a very dependable one. Obviously it is more apt to be a measure of factors which bring patients to certain hospitals than a measure of local disease prevalence. But if several hospitals within a given area can be included in a survey of this type, the individual differences between different institutions may be partially ironed out, and the combined figures should at least give a fair estimate of that fraction of the total local cases of this disease which are hospitalized.

Such analyses as these, viz, of hospital admission rates for rheumatic fever, have been compiled on a national (or continental) scale by the Seegals (*2*), whose studies may serve as a precedent for this one. The Seegals collected data on the percentage of rheumatic fever patients admitted to the medical services of hospitals in widely separated regions in the United States and Canada, and they found widely differing results, ranging from 0.1 to 5.5 percent. The differences in these rates were probably significant from more than one standpoint; for, in keeping with the general experience, the higher rates came from the northern (45° to 34°) latitudes, and the lowest ones from the southern (29° to 34°) latitudes. On a geographical basis, therefore, we have a base line from these studies by the Seegals, to which the New Haven findings may be related. According to their estimates, the New Haven medical admission rate for rheumatic fever should be just under 2.0 percent.

METHODS

Our methods of obtaining data of this type will be reviewed in some detail because many variables enter the problem, and it may be important to know how they were handled.

Locale.—The city of New Haven[2] should be a fairly satisfactory

[2] This industrial and water-front city lies between the forty-first and forty-second parallel of north latitude. Its mean temperature is about 50° Fahrenheit, its normal annual precipitation is about 46 inches. Situated on sandy soil at an elevation of but a few feet above sea level, it is traversed by one river and several smaller water courses. The average population during the period covered by this study was about 163,500 for the city proper, and 240,000 for the metropolitan area, which includes the adjacent towns of West Haven, Hamden, East Haven and North Haven.

community for a survey of hospital admissions, first, because of its size, and second, because, whatever the climatologic or sociologic conditions are which predispose to rheumatic fever, they must exist here, for not only is the disease common but it is extremely prevalent in some sections of the city.

Hospitals.—There are three large, general hospitals in the city of New Haven from which all the data for this study have been drawn. They are (1) the New Haven Hospital (a teaching institution associated with the Yale University School of Medicine) with a total annual admission rate for the period 1929 through 1938 of 6,400 to 9,300 in-patients; (2) the Grace Hospital with a similar rate ranging from 5,500 to 6,800; and (3) the Hospital of St. Raphael with a rate of 5,400 to 7,100. From 53 to 70 percent of the patients admitted to these three hospitals come from the city of New Haven, and from 69 to 86 percent come from the local metropolitan area. There are other "specialized hospitals" and smaller local institutions for the care of the sick in this city but they are probably insignificant from the standpoint of this study. There is also a hospital for children, with a special department for rheumatic fever patients; but as practically all such patients are referred there from one of the general hospitals, the admission rates of this last institution do not concern us in this study. The three general hospitals, which do concern us, take medical and pediatric patients, and have private and charity wards. The New Haven Hospital is the only one equipped with an isolation unit for contagious diseases.

Diagnostic criteria and examination of records.—An attempt was made to examine the records of all patients with active rheumatic fever and with inactive rheumatic heart disease from these three hospitals during the 10-year period 1929–38.[3] The first group, designated as "active rheumatic fever," includes patients diagnosed as having rheumatic fever, chorea, and active rheumatic heart disease, or various combinations of these three; the second group has been designated as "inactive rheumatic heart disease." The diagnoses made by each hospital were accepted in all but three or four instances, where they were recorded as questionable and seemed highly improbable. These cases were excluded.

Individual histories of all the rheumatic fever patients from the three hospitals were examined to determine whether or not the patient was a resident of New Haven at the time he was taken sick. The following details were also included for the active cases: The month of

[3] For permission to examine the hospital records we are indebted to Mr. James A. Hamilton, superintendent of the New Haven Hospital, Mr. Sidney Davidson, superintendent of the Grace Hospital, and Sister Elenita, superintendent of the Hospital of St. Raphael. The cooperation and invaluable assistance of Miss Marion Forsyth, record librarian of the New Haven Hospital, Mrs. Erma Black, librarian of the Grace Hospital, and Miss M. Dorothy Graham, librarian of the Hospital of St. Raphael, are gratefully acknowledged.

onset of the attack; the month of hospital admission; the precursor infection or condition; the type of attack, viz, first or recurrent; and the age of the patient. We were unsuccessful in obtaining data from all three hospitals for the 10-year period 1929–1938, since only data for the 6 years 1933–1938 were available from the Grace Hospital. A total of 526 histories of active rheumatic fever cases were examined. Of these, the place of residence was determined in 524, the month of onset was recorded for 525, the precursor infection or condition for 302; and the type of attack (whether first, second, or third, etc.) for 452.

Estimate of rheumatic fever hospital admission rates.—Admission rates were calculated on several bases but mainly on the total annual admissions to the medical services of each hospital (including pediatric and contagious services). This follows the precedent of the Seegals (*2*) for obtaining this type of data. This procedure was adopted by them so that the recorded frequency of rheumatic fever admissions in any given hospital would not be influenced by the presence or absence of large obstetrical or surgical services in one institution, as compared with smaller nonmedical services in others.

TABLE 1.—*Admission rates for rheumatic fever to 3 hospitals in New Haven for the 6-year period 1933–38, inclusive*

Hospital	Total admissions to all services (T. A.)	Total medical admissions (M. A.)	Active rheumatic fever			Inactive rheumatic heart disease		
			Number of cases	Rates		Number of cases	Rates	
				Percent of T. A.	Percent of M. A.		Percent of T. A.	Percent of M. A.
New Haven	50,526	12,808	259	0.51	2.02	355	0.70	2.77
Grace	37,022	5,961	63	.17	1.05	123	.30	2.06
St. Raphael's	37,242	11,833	25	.06	.21	41	.11	.34

As an illustration of the manner in which the local hospitals differed in this respect, it is found that the active rheumatic fever rates are from three to six times lower if estimated on the basis of total hospital admissions (T. A.) rather than on the basis of medical admissions alone (M. A.). (See table 1.) In other words the ratio of nonmedical to medical patients is about twice as large in some hospitals as it is in others. But even if rates are estimated from the medical admissions alone, it is obvious that there will still be wide differences between individual hospitals. Such differences may be due to the individual equipment or facilities of each hospital, and in this respect the proportion of children in the hospital population (or the size of the pediatric service) is important. Furthermore the clinical interests of individual members of the medical staffs of the hospitals probably determine the frequency with which the diagnosis of rheumatic fever

and rheumatic heart disease is made. Thus, it is also shown in table 1 that the New Haven Hospital rates for active rheumatic fever are from 8 to 10 times those of the Hospital of St. Raphael. It should be emphasized, however, that the New Haven Hospital and Dispensary maintain two special clinics for rheumatic fever patients. It can be seen that an erroneous impression might be gained if the figures from a single institution were taken as a measure of the local frequency of rheumatic fever.

Estimate of rates for the city proper.—Although these three hospitals draw the great majority of their patients from a region which is within a radius of 25 miles of New Haven, and which more or less represents New Haven County, it is obvious that the *hospital rates* which appear in table 1 are only roughly applicable to the local county.[4] The situation can be covered by the broad statement that from 69 to 86 percent of the rheumatic fever patients admitted to the three local hospitals came from greater New Haven, that is, from an area which lies within 6 to 12 miles of the center of the city. However, actual rates from the city proper were determined as follows: All patients with active rheumatic fever who lived in the city were picked out from the lists in each hospital. (See column designated R F.–N. H., table 2.) The total number of patients from the city proper who were admitted to the medical services of each hospital was then estimated. (See column designated M. A.–N. H., table 2.) From these two figures the annual *city rates* were estimated.

Primary or recurrent attacks.—As rheumatic fever is essentially a chronic or relapsing disease, it is obvious that a record of hospital admissions for the active cases does not give a correct picture of individual case incidence. In this respect hospital admission rates for rheumatic fever are perhaps comparable to those of tuberculosis, in distinction to those which might be obtained for measles. It has been stated that there were 452 active cases from which the attack rate was determined. Of these, 214 (47 percent) were admitted during the first attack, 149 (33 percent) during the second, and 56 (12 percent) during the third attack. The accuracy of these determinations may, however, be questioned because it is notoriously difficult to determine the "type" of attack from a study of hospital records. Many patients who enter a hospital with rheumatic fever at the age of 17 or 18 may give a questionable history of growing pains at the age of 8 or 10, but whether or not this should be interpreted as meaning that the symptoms in childhood actually represent the first attack of rheumatic fever is often difficult to decide. Certainly many "first attacks" of this disease give rise to very little in the way of recognizable symptomatology. In our own dispensary series of patients with rheumatic

[4] As an example of how a hospital rate may not necessarily reflect the rate of the local community, the Mayo Clinic might be mentioned.

heart disease (in the age group 5 to 20 years) 25 percent failed to give any history of an attack of active rheumatic fever prior to the time at which the "old" cardiac lesion was first detected. In the light of this situation it seems reasonable to group all active rheumatic fever cases together, with the realization that probably half of them represent recurrent attacks and a certain percentage of the latter group are readmissions so that the same patient is occasionally counted two or more times. In any event it should be emphasized that the final number of "cases" actually represents the number of admissions for active or inactive rheumatic fever, and not the individual number of patients. The figures are compiled in this manner for the sake of conformity with other series.

RESULTS

Annual admission rates for active rheumatic fever, computed by the methods just described, are listed in the last three columns of table 2. They represent (1) the percentage of rheumatic fever admissions (active cases) to the medical services of the local hospitals during this 10-year period, viz, the "hospital rates," and (2) the percentage of active case admissions from the city alone, viz, the "city rates." The average of these two rates for active cases is almost the same, about 1.2 percent.[5] Fluctuations in the admission rates of active cases occur from year to year, ranging from 0.7 to 1.7 percent. To emphasize this, the rates have also been presented in the form of graphs (fig. 1). In spite of wide annual differences, however, no particular trends are apparent, and it cannot be said that this type of analysis reveals evidence that the disease is on the increase or decrease in New Haven.

The total admissions for both active and inactive rheumatic fever make up 2.7 percent of all admissions to the medical services of the three local hospitals. It is important to know how this compares with other common diseases from this locality, or in other words to estimate the relative size of the local rheumatic fever problem insofar as hospital admissions are concerned. For this comparison we have selected some of the diseases which were chosen by Hedley (*5*) for his comparison of rheumatic fever mortality rates with those of other diseases. Hedley chose two chronic infectious diseases, tuberculosis and syphilis, and a number of acute infectious diseases, including scarlet fever, diphtheria, acute poliomyelitis, measles, and pertussis. For our comparison, data were obtained from the New Haven Hospital alone, because the other two local hospitals do not have infectious disease services.

[5] This figure (1 2 percent) is well below the rate of 1 9 percent which might have been predicted on the basis of the Seegals' data (*2*) If calculated from the St Raphael's Hospital data alone, it would have been about 0 2 percent, and if calculated from the New Haven Hospital data alone it would have been about equal to the predicted rate of 1 9 percent.

TABLE 2.—*Data from the three hospitals*

Year	Hospital	Number of admissions: For total hospital population: Rheumatic Fever	Chorea	Rheumatic heart disease: Active	Rheumatic heart disease: Inactive	Total active (R. F.)	From New Haven: Active R. F. (R. F.-N. H.)	Hospital admissions: Total (T. A.)	To medical services (M. A.)	M. A. *from* city of New Haven (M. A.-N. H.)	Admission rates, Percent of—: M. A. which are active R. F. cases	M. A. which are inactive R. F. cases	M. A. N. H. which are active R. F.-N. H. cases
1929	N. H. H.	5	1	24	23			6,429	1,760	1,074			
	Grace							6,255					
	St. R.	4	0	0	0			5,428	1,690	1,149			
	Total	9	1	24	23	34	17		3,450	2,223	0.98	0 67	0.76
1930	N. H. H.	7	8	28	43			6,580	1,721	1,050			
	Grace							6,442					
	St. R.	3	1	3	4			5,812	1,813	1,233			
	Total	10	9	31	47	49	28		3,534	2,287	1.38	1.33	1.22
1931	N. H. H.	19	6	26	65			6,779	1,935	1,161			
	Grace							6,146					
	St. R.	2	0		1			5,957	1,910	1,319			
	Total	21	6	26	66	53	33		3,845	2,480	1.37	1.71	1.33
1932	N. H. H.	13	2	24	45			7,555	2,239	1,221			
	Grace							5,393					
	St. R.	2	0	1	1			6,129	1,607	1,093			
	Total	15	2	25	46	42	29		3,846	2,314	1.09	1.19	1.25
1933	N. H. H.	23	8	33	52			7,416	1,833	1,178			
	Grace	6	0	7	11			5,543	888	684			
	St. R.	0	0	1	3			5,739	1,680	1,142			
	Total	29	8	41	66	78	48		4,401	3,004	1.77	1.49	1.59
1934	N. H. H.	7	0	21	70			7,042	1,986	1,211			
	Grace	1	0	3	24			5,724	860	568			
	St. R.	0	0	2	11			5,632	1,803	1,226			
	Total	8	0	26	105	34	24		4,649	3,005	.73	2.25	.79
1935	N. H. H.	17	5	24	79			8,686	2,125	1,211			
	Grace	4	0	6	21			6,290	879	599			
	St. R.	1	0	2	3			5,735	1,987	1,351			
	Total	22	5	32	103	59	40		4,991	3,161	1.18	2.06	1.58
1936	N. H. H.	12	0	24	63			8,860	2,075	1,120			
	Grace	4	0	7	16			5,944	1,039	717			
	St. R.	6	0	2	4			6,175	1,933	1,314			
	Total	22	0	33	83	55	37		5,047	3,151	1.11	1.64	1.11
1937	N. H. H.	5	2	35	49			9,164	2,344	1,265			
	Grace	2	0	11	17			6,699	1,118	760			
	St. R.	0	0	5	7			6,815	2,153	1,464			
	Total	7	2	51	73	60	48		5,615	3,489	1.06	1.30	1.38
1938	N. H. H.	7	2	34	42			9,358	2,444	1,295			
	Grace	4	0	8	34			6,822	1,177	824			
	St. R.	1	0	5	13			7,144	2,177	1,480			
	Total	12	2	47	89	61	37		5,798	3,599	1.22	1.53	1.03
Grand total		155	35	336	701	526	341	199,689					
Average per year											1.19	1.52	1.20

[1] Percentages are computed from 2 of the hospitals for the years 1929 through 1932, and from all 3 hospitals for the years 1933 through 1938.

The purpose of this comparison (fig. 2) is to demonstrate the relative position occupied by rheumatic fever (both active and inactive)

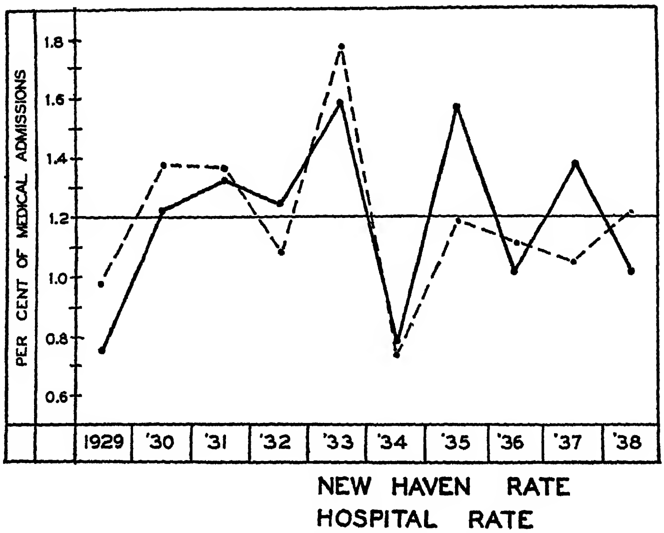


FIGURE 1.—Admission rates for active cases of rheumatic fever to three local hospitals for the 6-year period 1933–38, and to two hospitals for the 4-year period 1929–32. The hospital rate represents annual admissions for cases, computed from the total annual admissions to the medical services; the New Haven rate represents city cases alone, computed from total medical admissions from the city alone. The horizontal line across the graph indicates the average of both the hospital and city rates.

among some of the chronic and acute infectious diseases insofar as admissions to one of the local hospitals are concerned. This chart

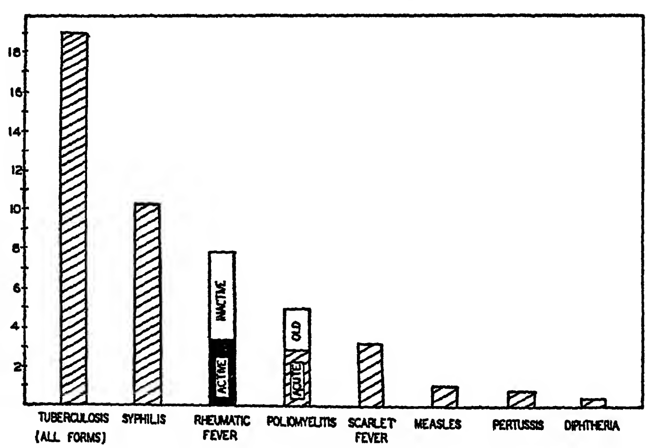


FIGURE 2.—Rates at which cases representing 8 different chronic and acute infectious diseases were admitted to the New Haven Hospital during the period 1929–38, inclusive.

is not a demonstration of relative local disease frequency. The height of each column in figure 2, indicating the numbers of ad-

missions for each disease to the medical services of the New Haven Hospital, is rather a rough measure of the relative "severity" of each of these diseases in this locality. The important position occupied by rheumatic fever among the other infectious diseases is obvious.

DISCUSSION

Having ascertained that (*a*) the average number of hospitalized cases of active rheumatic fever on a 6-year basis in the city of New Haven is 40 per year (a case rate of 29 per 100,000), and (*b*) that these patients make up 1.2 percent of the admissions to the medical services of the three hospitals in this city, the next point is to see what these figures mean. From the onset it is granted that the hospital admission figures for this disease represent a limited measure of its local prevalence, for even if all the local cases of rheumatic fever were diagnosed, it is obvious that only a fraction of the diagnosed cases would be hospitalized. And yet, by and large, the hospital figures for the city are probably as accurate a relative measure of local prevalence of rheumatic fever as those which might be obtained if this disease were a reportable one here.[6] The future alone can verify this statement.

Although the data are not an accurate index of prevalence, they may be a partial index of the local "severity" of the disease insofar as certain other chronic and acute infectious diseases are concerned. This relative measure of severity has been expressed in figure 2 as a measure of the numerical extent to which local physicians use the New Haven Hospital for these particular diseases. With acute poliomyelitis (which occupies an important place in this graph because of the epidemic of 1931) this usage of the hospital becomes a rough measure of the prevalence of recognized cases, because such a large percentage of the local cases of acute poliomyelitis were hospitalized during this period; with measles and pertussis, on the other hand, it is not a measure of local prevalence at all. With rheumatic fever the height of the column in figure 2 probably measures the combined factors of local prevalence and local "severity."

This measure of the annual number of local hospitalized cases of rheumatic fever can also be considered in the light of the prevalence of rheumatic heart disease among the local school children. The latter determination was made in 1933 (*3*) among two large groups of New Haven school children. Among them the rheumatic heart disease rate was found to range from 1.4 to 3.4 percent. We have no way of actually relating this local prevalence of "old" rheumatic heart disease in the school children to the local hospital admission rates for

[6] From a sickness survey conducted in 1926 in Hagerstown, Md., where the local physicians were aware that their "work was being checked," Sydenstricker (*6*) found that 85 percent of the cases of diphtheria, scarlet fever, and influenza were reported, 60 percent of the cases of pneumonia, 30 to 40 percent of measles, whooping cough, and chickenpox, and practically no cases of scabies (*6*).

active cases of rheumatic fever. There are too many unknown factors in this relationship and, as has already been mentioned, not the least among them is the fact that about 25 percent of the local patients with old rheumatic heart disease fail to give a history of ever having had rheumatic fever. But it is of value to know what the observed hospital rate is, in an area where the observed juvenile cardiac rate has also been recorded; and we believe that both figures should be quoted if the local picture of the disease is to be adequate.

Thus, several measures of the prevalence of the disease and of its severity, each one perhaps indicating a different phase of the problem, have been mentioned here. The relative significance of these various measures can best be appreciated when similar comparisons are available from other localities.

SUMMARY

1. Data relative to rheumatic fever have been collected from all of the three general hospitals in the city of New Haven, Conn., and from these data estimates have been made on the annual number of active and inactive cases of rheumatic fever admitted to these institutions.

2. The average number of hospitalized cases of active rheumatic fever in the city of New Haven is 40 per year (an annual case rate of 29 per 100,000).

3. The active cases make up 1.2 percent of the admisssions to the medical services of local hospitals, and the inactive rheumatic heart disease cases make up an additional 1.5 percent of these admissions.

4. From the standpoint of total admissions to the medical service of the New Haven Hospital this disease occupies a position of numerical importance which is greater than that of other acute infectious diseases, such as poliomyelitis, scarlet fever, measles, pertussis, and diphtheria, but less than that of the two major chronic infectious diseases, tuberculosis and syphilis.

5. We now have two rough measures of the prevalence and of the severity of this disease in this community. Their relative significance can be best appreciated when comparisons are eventually available from other localities.

REFERENCES

(*1*) Seegal, D., and Seegal, B. C.: Studies on the epidemiology of rheumatic fever. Annual incidence in some hospitals in the United States, its possessions, and Canada. J. Am. Med. Assoc., 89: 11 (1927).

(*2*) Seegal, D., Seegal, B. C., and Jost, E. L.: Comparative study of the geographic distribution of rheumatic fever, scarlet fever, and acute glomerulonephritis in North America. Am. J. Med. Sci., 190: 383 (1935).

(*3*) Paul, J. R., Harrison, E. R., Salinger, R., and DeForest, G. K.: The social incidence of rheumatic heart disease. A statistical study in New Haven school children. Am. J. Med. Sci., 188: 301 (1934).

(*4*) Paul, J. R., and Dixon, G. L.: Climate and rheumatic heart disease. A survey among American Indian school children in northern and southern localities. J. Am. Med. Assoc., 108: 2096 (1937).

(5) Hedley, O. F.: Mortality from rheumatic heart disease in Philadelphia during 1936. Pub. Health Rep., 52. 1907 (1937).
(6) Sydenstricker, E.: A study of illness in a general population group. Pub. Health Rep., 41: 2069 (1926) and subsequent issues.

PRELIMINARY 1940 POPULATION FIGURES FOR THE UNITED STATES, BY STATES

The population of the United States on April 1, 1940, was 131,409,881, according to a preliminary count based on returns of the 1940 census, as announced by the Bureau of the Census, Department of Commerce. As compared with the 1930 population of 122,775,046, there was an increase of 8,634,835 between 1930 and 1940, or 7 percent, as compared with an increase of 16.1 percent during the period 1920–30. The rate of increase in the last decade is less than one-half that shown in any previous decade since the first census in 1790. This slackening in population growth is stated to be due to the declining birth rate and the virtual cessation of immigration from foreign countries.

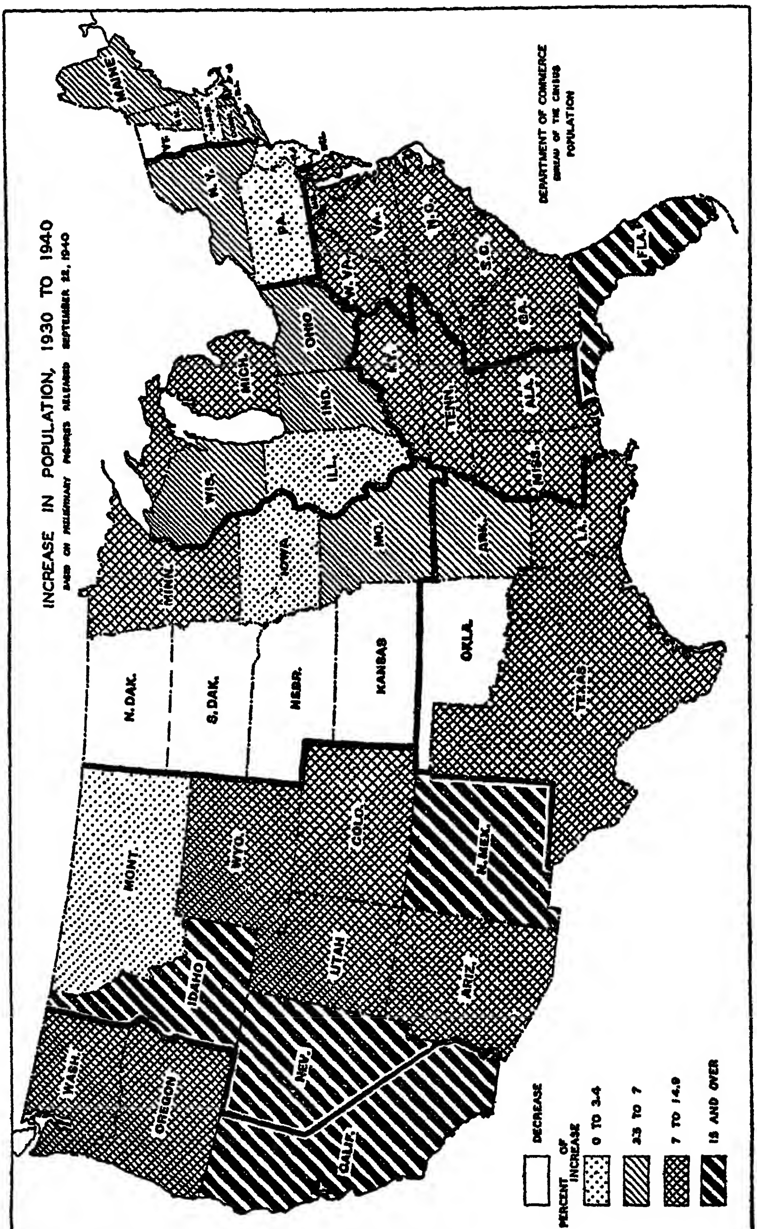
Classed with the States, the District of Columbia recorded the highest increase, 36.2 percent; but excluding this area, Florida, with an increase in population of 27.9 percent, led the other States, followed by New Mexico, with 24.9 percent, and California, with 21.1 percent. Six States, namely, Kansas, Nebraska, North Dakota, Oklahoma, South Dakota, and Vermont, decreased in population between 1930 and 1940. The first five of these States are located in the Great Plains and are included in the so-called "dust bowl" area, extending from the Canadian border to Texas. In no previous decade have more than three States decreased in population. Montana reversed its decline in the 1920–30 period, recording an increase in the later decade, and 11 States (Delaware, Georgia, Idaho, Kentucky, Maine, Minnesota, Nevada, New Hampshire, New Mexico, South Carolina, and Virginia) and the District of Columbia increased more rapidly in the later decennium than in the preceding one.

In absolute figures, the increase in California exceeded that of any other State (1,196,437 as compared with 791,556 for New York, the next largest increase), while in seven other States the increase exceeded 250,000.

The 1940 population census indicates several changes in the relative population rank of States since 1930; but the displacement of Texas by California in fifth place was the only change in the first 10 States with the largest populations.

Table 1 shows the population data by geographic divisions and the States included in those divisions. It should be noted that the total for the United States includes 125,000 not assigned by States. This

is an estimated allowance for supplemental figures which could not be allotted to the various States.



It may be noted that all of the northern States, that is, the first four of the geographic divisions in table 1, which had nearly 60 percent of

TABLE 1.—*Summary of preliminary population figures for the United States, 1940*

[A minus sign (−) denotes decrease]

Division and State	Population 1940	Population 1930	Increase 1930–1940	Percent of increase 1930–1940	Percent of increase 1920–1930
United States total, including allowance for supplementals	131,409,881	122,775,046	8,634,835	7.0	16.1
Estimated allowance for supplementals not distributed by States	125,000				
Total of State figures	131,284,881	122,775,046	8,509,835	6.9	16.1
Geographic divisions:					
New England	8,426,566	8,166,341	260,225	3.2	10.3
Middle Atlantic	27,419,893	26,260,750	1,159,143	4.4	18.0
East North Central	26,550,823	25,297,185	1,253,638	5.0	17.8
West North Central	13,490,492	13,296,915	193,577	1.5	6.0
South Atlantic	17,771,099	15,793,589	1,977,510	12.5	12.9
East South Central	10,762,967	9,887,214	875,753	8.9	11.2
West South Central	13,052,218	12,176,830	875,388	7.2	18.9
Mountain	4,128,042	3,701,789	426,233	11.5	11.0
Pacific	9,682,781	8,194,433	1,488,348	18.2	47.2
New England:					
Maine	845,139	797,423	47,716	6.0	3.8
New Hampshire	489,716	465,293	24,423	5.2	5.0
Vermont	357,598	359,611	−2,013	−0.6	2.0
Massachusetts	4,312,332	4,249,614	62,718	1.5	10.3
Rhode Island	711,669	687,497	24,172	3.5	13.7
Connecticut	1,710,112	1,606,903	103,209	6.4	16.4
Middle Atlantic:					
New York	13,379,622	12,588,066	791,556	6.3	21.2
New Jersey	4,148,562	4,041,334	107,228	2.7	28.1
Pennsylvania	9,891,709	9,631,350	260,359	2.7	10.5
East North Central:					
Ohio	6,889,623	6,646,697	242,926	3.7	15.4
Indiana	3,416,152	3,238,503	177,649	5.5	10.5
Illinois	7,874,155	7,630,654	243,501	3.2	17.7
Michigan	5,245,012	4,842,325	402,687	8.3	32.0
Wisconsin	3,125,881	2,939,006	186,875	6.4	11.7
West North Central:					
Minnesota	2,785,896	2,563,953	221,943	8.7	7.4
Iowa	2,535,430	2,470,939	64,491	2.6	2.8
Missouri	3,775,737	3,629,367	146,370	4.0	6.6
North Dakota	639,690	680,845	−41,155	−6.0	5.3
South Dakota	641,134	692,849	−51,715	−7.5	8.8
Nebraska	1,313,468	1,377,963	−64,495	−4.7	6.3
Kansas	1,799,137	1,880,999	−81,862	−4.4	6.3
South Atlantic:					
Delaware	264,603	238,380	26,223	11.0	6.9
Maryland	1,811,546	1,631,526	180,020	11.0	12.5
District of Columbia	663,153	486,869	176,284	36.2	11.3
Virginia	2,664,847	2,421,851	242,996	10.0	4.9
West Virginia	1,900,217	1,729,205	171,012	9.9	18.1
North Carolina	3,563,174	3,170,276	392,898	12.4	23.9
South Carolina	1,905,815	1,738,765	167,050	9.6	3.3
Georgia	3,119,953	2,908,506	211,447	7.3	0.4
Florida	1,877,791	1,468,211	409,580	27.9	51.6
East South Central:					
Kentucky	2,839,927	2,614,589	225,338	8.6	8.2
Tennessee	2,910,992	2,616,556	294,436	11.3	11.9
Alabama	2,830,285	2,646,248	184,037	7.0	12.7
Mississippi	2,181,763	2,009,821	171,942	8.6	12.2
West South Central:					
Arkansas	1,948,268	1,854,482	93,786	5.1	5.8
Louisiana	2,355,821	2,101,593	254,228	12.1	16.9
Oklahoma	2,329,808	2,396,040	−66,232	−2.8	18.1
Texas	6,418,321	5,824,715	593,606	10.2	24.9
Mountain:					
Montana	554,136	537,606	16,530	3.1	−2.1
Idaho	523,440	445,032	78,408	17.6	3.0
Wyoming	246,763	225,565	21,198	9.4	16.0
Colorado	1,118,820	1,035,791	83,029	8.0	10.2
New Mexico	528,687	423,317	105,370	24.9	17.5
Arizona	497,789	435,573	62,216	14.3	30.3
Utah	548,393	507,847	40,546	8.0	13.0
Nevada	110,014	91,058	18,956	20.8	17.6
Pacific:					
Washington	1,721,376	1,563,396	157,980	10.1	15.2
Oregon	1,087,717	953,786	133,931	14.0	21.8
California	6,873,688	5,677,251	1,196,437	21.1	65.7

the population in 1930, contribute only about one-third of the increase in the later decade. The southern States, however, comprising the next three geographic divisions shown in table 1, which had less than 31 percent of the 1930 population, show nearly 44 percent of the increase; and the western States, comprising the Mountain and Pacific divisions, with less than 10 percent of the 1930 population, contribute more than 22 percent of the increase.

Practically all of the industrial States recorded a rate of increase less than the national average. Even omitting the "dust bowl" States, the four northern divisions show a smaller percentage of the increase than the percentage of the total population in either 1930 or 1940. The relatively more rapid increase in the southern States is explained in part by higher birth rates and the fact that a larger proportion of their population increase probably remained within these States than in recent previous decades. The increase on the Pacific coast, it is stated, probably represents the continued settlement and development of new territory, while the rapid increase of the populations of California and Florida is presumably attributed principally to the tendency of certain classes of population to migrate to a warmer climate. The increase in the Mountain States may have been affected by the same factor suggested for the southern States and by migrations from the "dust bowl" States.

TABLE 2.—*Relative rank of States according to population, 1940 and 1930*

State	Rank		Population		State	Rank		Population	
	1940	1930	1940	1930		1940	1930	1940	1930
New York	1	1	13,379,622	12,588,066	West Virginia	26	27	1,900,217	1,729,205
Pennsylvania	2	2	9,891,709	9,631,350	Florida	27	31	1,877,791	1,468,211
Illinois	3	3	7,874,155	7,630,654	Maryland	28	28	1,811,546	1,631,526
Ohio	4	4	6,889,623	6,646,697	Kansas	29	24	1,799,137	1,880,999
California	5	6	6,873,688	5,677,251	Washington	30	30	1,721,376	1,563,396
Texas	6	5	6,418,321	5,824,715	Connecticut	31	29	1,710,112	1,606,903
Michigan	7	7	5,245,012	4,842,325	Nebraska	32	32	1,313,468	1,377,963
Massachusetts	8	8	4,312,332	4,249,614	Colorado	33	33	1,118,820	1,035,791
New Jersey	9	9	4,148,562	4,041,334	Oregon	34	34	1,087,717	953,786
Missouri	10	10	3,775,737	3,629,367	Maine	35	35	845,139	797,423
North Carolina	11	12	3,563,174	3,170,276	Rhode Island	36	37	711,669	687,497
Indiana	12	11	3,416,152	3,238,503	Dist. of Columbia	37	41	663,153	486,869
Wisconsin	13	13	3,125,881	2,939,006	South Dakota	38	36	641,134	692,849
Georgia	14	14	3,119,953	2,908,506	North Dakota	39	38	639,690	680,845
Tennessee	15	16	2,910,992	2,616,556	Montana	40	39	554,136	537,606
Kentucky	16	17	2,839,927	2,614,589	Utah	41	40	548,393	507,847
Alabama	17	15	2,830,285	2,646,248	New Mexico	42	45	528,687	423,317
Minnesota	18	18	2,785,896	2,563,953	Idaho	43	43	523,440	445,032
Virginia	19	20	2,664,847	2,421,851	Arizona	44	44	497,789	435,573
Iowa	20	19	2,535,430	2,470,939	New Hampshire	45	42	489,716	465,293
Louisiana	21	22	2,355,821	2,101,593	Vermont	46	46	357,598	359,611
Oklahoma	22	21	2,329,808	2,396,040	Delaware	47	47	264,603	238,380
Mississippi	23	23	2,181,763	2,009,821	Wyoming	48	48	246,763	225,565
Arkansas	24	25	1,948,268	1,854,482	Nevada	49	49	110,014	91,058
South Carolina	25	26	1,905,815	1,738,765					

In table 2 the States are arranged according to relative population rank in 1940, with their relative position in 1930 also shown, and table 3 presents them in the order of percentage increase during the last decade.

TABLE 3.—*States in order of percentage of increase, 1930 to 1940*

State	Percent increase [1]	State	Percent increase	State	Percent increase
Continental United States	6.9	16. Virginia	10.0	33. New Hampshire	5.2
1. Dist. of Columbia	36.2	17. West Virginia	9.9	34. Arkansas	5.1
2. Florida	27.9	18. South Carolina	9.6	35. Missouri	4.0
3. New Mexico	24.9	19. Wyoming	9.4	36. Ohio	3.7
4. California	21.1	20. Minnesota	8.7	37. Rhode Island	3.5
5. Nevada	20.8	21. Kentucky	8.6	38. Illinois	3.2
6. Idaho	17.6	22. Mississippi	8.6	39. Montana	3.1
7. Arizona	14.3	23. Michigan	8.3	40. Pennsylvania	2.7
8. Oregon	14.0	24. Colorado	8.0	41. New Jersey	2.7
9. North Carolina	12.4	25. Utah	8.0	42. Iowa	2.6
10. Louisiana	12.1	26. Georgia	7.3	43. Massachusetts	1.5
11. Tennessee	11.3	27. Alabama	7.0	44. Vermont	−0.6
12. Maryland	11.0	28. Connecticut	6.4	45. Oklahoma	−2.8
13. Delaware	11.0	29. Wisconsin	6.4	46. Kansas	−4.4
14. Texas	10.2	30. New York	6.3	47. Nebraska	−4.7
15. Washington	10.1	31. Maine	6.0	48. North Dakota	−6.0
		32. Indiana	5.5	49. South Dakota	−7.5

[1] A minus sign (−) denotes decrease.

All of the 1940 figures here presented are based on counts made in the field by the local supervisors and are subject to revision when the final count of the census returns is completed in Washington. The Bureau of the Census states that final population figures are now being released State by State, and that the final figures for the United States on this basis will probably be available about the middle of November.

While it may be advisable to wait for the final counts for the compilation of morbidity and other rates based on population, in view of the fact that they will soon be available, the changes will probably not be sufficiently large to affect materially rates computed on the basis of these preliminary figures.

PRELIMINARY 1940 CENSUS FIGURES FOR CITIES OF 100,000 OR MORE POPULATION

The Bureau of the Census announces that, according to preliminary figures, on April 1, 1940, there were 37,837,296 persons in the United States living in cities of 100,000 or more population, as compared with 36,195,171 in 1930. This represents an increase in the population of cities of this size of 4.5 percent during the decade 1930–40, as compared with an increase of 23.6 percent during the preceding decennium and with an increase of 7 percent in the total population of the United States between 1930 and 1940.

In 1940 there were 92 cities with 100,000 or more inhabitants, 1 less than the number of such cities in 1930. Sacramento, Calif., and

Charlotte, N. C., were included in this group for the first time, while El Paso, Tex., Lynn, Mass., and Evansville, Ind., dropped below 100,000 population.[1]

The most rapid growth in population between 1930 and 1940 occurred in Miami, Fla., which increased by 54.4 percent, followed by San Diego, Calif. (36.5 percent), and Washington, D. C. (36.2 percent). It was stated that no city in the northeast area of the United States was in the list of the most rapidly growing cities of 100,000 or more population.

Twenty-nine of the cities in this group lost in population between 1930 and 1940, as compared with only 4 showing a decrease between 1920 and 1930. Three cities, namely, Fall River and Lowell, Mass., and Wilmington, Del., reversed declines in the 1920–30 period and registered slight increases in the later decade, while only one city, Washington, D. C., increased in population more rapidly between 1930 and 1940 than between 1920 and 1930.

The 1940 figures are based on counts made by the local supervisors and are subject to revision on final counts at the Bureau of the Census. As the relative standing of these cities, with respect to population, is not likely to be altered by the final figures (with some possible exceptions, such as the decision with respect to annexed area in Evansville, Ind.), the list is presented in the accompanying table for convenience in making comparisons of populations and of the changes in the two decades.

Preliminary populations of cities having, in 1940, 100,000 inhabitants or more, arranged according to rank

[A minus sign (—) denotes decrease]

Rank		City	Population		Increase, 1930–1940	Percent of increase	
1940	1930		1940	1930		1930–40	1920–30
1	1	New York, N. Y.	7,380,259	6,930,446	449,813	6.5	23.3
2	2	Chicago, Ill.	3,384,556	3,376,438	8,118	0.2	25.0
3	3	Philadelphia, Pa.	1,935,086	1,950,961	—15,875	—0.8	7.0
4	4	Detroit, Mich.	1,618,549	1,568,662	49,887	3.2	57.9
5	5	Los Angeles, Calif.	1,496,792	1,238,048	258,744	20.9	114.7
6	6	Cleveland, Ohio	878,385	900,429	—22,044	—2.4	13.0
7	8	Baltimore, Md.	854,144	804,874	49,270	6.1	9.7
8	7	St. Louis, Mo.	813,748	821,960	—8,212	—1.0	6.3
9	9	Boston, Mass.	769,520	781,188	—11,668	—1.5	4.4
10	10	Pittsburgh, Pa.	665,384	669,817	—4,433	—0.7	13.8
11	14	Washington, D. C.	663,153	486,869	176,284	36.2	11.3
12	11	San Francisco, Calif.	629,553	634,394	—4,841	—0.8	25.2
13	12	Milwaukee, Wis.	589,558	578,249	11,309	2.0	26.5
14	13	Buffalo, N. Y.	575,150	573,076	2,074	0.4	13.1
15	16	New Orleans, La.	492,282	458,762	33,520	7.3	18.5
16	15	Minneapolis, Minn.	489,971	464,356	25,615	5.5	22.0
17	17	Cincinnati, Ohio	452,852	451,160	1,692	0.4	12.4
18	18	Newark, N. J.	428,236	442,337	—14,101	—3.2	6.7
19	19	Kansas City, Mo.	400,175	399,746	429	0.1	23.2
20	21	Indianapolis, Ind.	386,170	364,161	22,009	6.0	15.9
21	26	Houston, Tex.	386,150	292,352	93,798	32.1	111.4
22	20	Seattle, Wash.	366,847	365,583	1,264	0.3	15.9
23	22	Rochester, N. Y.	324,694	328,132	—3,438	—1.0	10.9
24	24	Louisville, Ky.	318,713	307,745	10,968	3.6	31.0
25	29	Denver, Colo.	318,415	287,861	30,554	10.6	12.2

[1] The population of Evansville, previously given as 111,034, included an area thought to be annexed, but regarding which court action is pending.

Preliminary populations of cities having, in 1940, 100,000 inhabitants or more, arranged according to rank—Continued

[A minus sign (−) denotes decrease]

Rank 1940	Rank 1930	City	Population 1940	Population 1930	Increase, 1930–1940	Percent of increase 1930–40	Percent of increase 1920–30
26	25	Portland, Oreg.	307,572	301,815	5,757	1.9	16.9
27	28	Columbus, Ohio	304,936	290,564	14,372	4.9	22.6
28	30	Oakland, Calif.	304,909	284,063	20,846	7.3	31.4
29	32	Atlanta, Ga.	302,538	270,366	32,172	11.9	34.8
30	23	Jersey City, N. J.	301,012	316,715	−15,703	−5.0	6.2
31	33	Dallas, Tex.	293,306	260,475	32,831	12.6	63.8
32	36	Memphis, Tenn.	291,312	253,143	38,169	15.1	55.9
33	31	St. Paul, Minn.	288,023	271,606	16,417	6.0	15.7
34	27	Toledo, Ohio	281,096	290,718	−9,622	−3.3	19.6
35	34	Birmingham, Ala.	264,151	259,678	4,473	1.7	45.2
36	37	Providence, R. I.	253,214	252,981	233	0.1	6.5
37	38	San Antonio, Tex.	253,143	231,542	21,601	9.3	43.5
38	35	Akron, Ohio	243,130	255,040	−11,910	−4.7	22.4
39	39	Omaha, Nebr.	223,185	214,006	9,179	4.3	11.7
40	41	Dayton, Ohio	211,456	200,982	10,474	5.2	31.7
41	40	Syracuse, N. Y.	205,637	209,326	−3,689	−1.8	21.9
42	43	Oklahoma City, Okla.	204,517	185,389	19,128	10.3	103.1
43	53	San Diego, Calif.	202,038	147,995	54,043	36.5	99.0
44	42	Worcester, Mass.	193,402	195,311	−1,909	−1.0	8.7
45	44	Richmond, Va.	190,341	182,920	7,412	4.1	6.6
46	48	Ft. Worth, Tex.	177,748	163,447	14,301	8.7	53.5
47	63	Jacksonville, Fla.	174,336	129,549	44,787	34.6	41.5
48	78	Miami, Fla.	170,877	110,637	60,240	54.4	274.1
49	45	Youngstown, Ohio	167,426	170,002	−2,576	−1.5	28.4
50	51	Nashville, Tenn.	167,415	153,866	13,549	8.8	30.0
51	47	Hartford, Conn.	166,329	164,072	2,257	1.4	18.9
52	46	Grand Rapids, Mich.	164,061	168,592	−4,531	−2.7	22.5
53	57	Long Beach, Calif.	163,441	142,032	21,409	15.1	155.5
54	49	New Haven, Conn.	160,257	162,655	−2,398	−1.5	0.1
55	56	Des Moines, Iowa	159,155	142,559	16,596	11.6	12.7
56	50	Flint, Mich.	151,275	156,492	−5,217	−3.3	70.8
57	59	Salt Lake City, Utah	150,019	140,267	9,752	7.0	18.8
58	52	Springfield, Mass.	148,989	149,900	−911	−0.6	15.7
59	54	Bridgeport, Conn.	146,900	146,716	184	0.1	2.2
60	62	Norfolk, Va.	143,275	129,710	13,565	10.5	12.0
61	61	Yonkers, N. Y.	142,404	134,646	7,758	5.8	34.4
62	58	Tulsa, Okla.	141,750	141,258	492	0.3	96.0
63	55	Scranton, Pa.	140,393	143,433	−3,040	−2.1	4.1
64	60	Paterson, N. J.	139,651	138,513	1,138	0.8	1.9
65	64	Albany, N. Y.	130,447	127,412	3,035	2.4	12.4
66	67	Chattanooga, Tenn.	128,138	119,798	8,340	7.0	106.9
67	65	Trenton, N. J.	124,685	123,356	1,329	1.1	3.4
68	70	Spokane, Wash.	122,462	115,514	6,948	6.0	10.6
69	66	Kansas City, Kans.	121,258	121,857	−599	−0.5	20.4
70	72	Ft. Wayne, Ind.	118,193	114,946	3,247	2.8	32.8
71	68	Camden, N. J.	117,777	118,700	−923	−0.8	2.1
72	69	Erie, Pa.	116,247	115,967	280	0.2	24.2
73	71	Fall River, Mass.	115,567	115,274	293	0.3	−4.3
74	77	Wichita, Kans.	113,540	111,110	2,430	2.2	53.9
75	81	Knoxville, Tenn.	112,002	105,802	6,200	5.9	36.0
76	80	Wilmington, Del.	111,432	106,597	4,835	4.5	−3.2
77	74	Cambridge, Mass.	111,120	113,643	−2,523	−2.2	3.6
78	92	Gary, Ind.	110,863	100,426	10,437	10.4	81.3
79	76	Reading, Pa.	110,704	111,171	−467	−0.4	3.1
80	75	New Bedford, Mass.	110,296	112,597	−2,301	−2.0	−7.1
81	73	Elizabeth, N. J.	109,396	114,589	−5,193	−4.5	19.6
82	83	Canton, Ohio	108,337	104,906	3,431	3.3	20.5
83	91	Tampa, Fla.	107,674	101,161	6,513	6.4	96.0
84	79	Tacoma, Wash.	107,520	106,817	703	0.7	10.2
85	96	Sacramento, Calif.	105,530	93,750	11,780	12.6	42.2
86	82	Peoria, Ill.	105,003	104,969	34	(1)	37.9
87	85	Somerville, Mass.	102,304	103,908	−1,604	−1.5	11.6
88	84	South Bend, Ind.	101,410	104,193	−2,783	−2.7	46.8
89	93	Lowell, Mass.	101,331	100,234	1,097	1.1	−11.1
90	89	Utica, N. Y.	100,534	101,740	−1,206	−1.2	8.1
91	103	Charlotte, N. C.	100,327	82,675	17,652	21.4	78.4
92	90	Duluth, Minn.	100,238	101,463	−1,225	−1.2	2.6

1 Less than one-tenth of 1 percent.

COURT DECISION ON PUBLIC HEALTH

Milk sellers held liable in action for damages on account of contraction of undulant fever.—(Washington Supreme Court; *Nelson* v. *West Coast Dairy Co. et al.*, 105 P.2d 76; decided August 30, 1940.) An action was brought to recover damages alleged to have been sustained as the result of undulant fever contracted from drinking raw milk. The defendants were the operators of a dairy farm, a dairy company operating a dairy in the city of Everett, and a husband and wife who conducted a milk route in Everett. The milk produced on the said dairy farm was sold to the defendant dairy company, which company in turn sold a part of the milk to the defendants conducting the milk route. An ordinance of the city of Everett provided, among other things, that it should be unlawful to sell for human consumption any milk drawn from cows suffering from any disease, or milk containing pathogenic bacteria or disease-producing germs, or milk which was unwholesome or impure. The plaintiff's cause of action was predicated not only on allegations charging the defendants with violation of this ordinance but also on the common-law doctrine governing liability for negligence or breach of warranty in the sale of food unfit for immediate human consumption. The action was tried to the court sitting without a jury and resulted in findings in the plaintiff's favor against the dairy company and the milk-route operators. The action was dismissed as against the dairy farm operators because, while in the trial court's opinion the impurity of the milk produced by them was established by a preponderance of the evidence, the proof further showed that a part of the milk delivered to the plaintiff through the defendant dairy company and milk-route operators was from another source and was likewise infected. On appeal to the supreme court the judgment of the trial court in favor of the plaintiff was affirmed.

One contention made by the defendants was that the dismissal of the action as to the defendant dairy farm operators required dismissal as to the remaining defendants, but the appellate court concluded otherwise, saying: "Where articles of food are sold for domestic use and immediate consumption, the law implies a warranty that such articles are sound, wholesome, and fit to be consumed, and if the consumer is made sick through the consumption of such food, he has a right of action against the vendors thereof, either for breach of implied warranty, or for negligence; and in such action it is unnecessary either to allege or to prove scienter." Further, the court said that the consumer's right of recovery was not limited to an action against his own immediate vendor but reached the retailer, wholesaler, producer, and all others who participated in the sale and distribution of such deleterious articles of food.

Another of the defendants' contentions presented the question whether or not the trial court's findings as to the cause of the plaintiff's illness were based on speculation and conjecture, which question necessitated a review of the evidence. Following this review the court said that it was of the opinion that the trial court was fully warranted in finding that the most probable cause of plaintiff's illness was his consumption of infected raw milk furnished by the defendant dairy company and milk-route operators and that in arriving at that conclusion the court was not moved by, nor required to indulge in, conjecture or speculation.

DEATHS DURING WEEK ENDED OCTOBER 5, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 5, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,776	7,363
Average for 3 prior years	7,698	
Total deaths, first 40 weeks of year	337,467	331,455
Deaths under 1 year of age	488	485
Average for 3 prior years	491	
Deaths under 1 year of age, first 40 weeks of year	20,065	20,066
Data from industrial insurance companies:		
Policies in force	64,812,208	66,619,958
Number of death claims	11,169	10,554
Death claims per 1,000 policies in force, annual rate	9.0	8.3
Death claims per 1,000 policies, first 40 weeks of year, annual rate	9.7	10.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 12, 1940

Summary

The decline in the incidence of poliomyelitis continued, though less sharply than in the preceding week. For the current period, the number of reported cases decreased from 555 to 516, or 7 percent, as compared with a drop in the preceding week from 711 to 555 cases, or a reduction of nearly 22 percent. The 5-year (1935–39) median for the current week is 306 cases. The largest numerical decreases occurred in the three areas—the two North Central and the South Atlantic—which have had the highest incidence. During the current week these areas reported 82 percent of the cases.

No unusual incidence was recorded for any of the other 8 communicable diseases included in the weekly table. The number of cases of influenza increased from 599 for the preceding week to 705 for the current week. The 5-year median expectancy is 649. For only influenza and poliomyelitis are the cumulative figures for the current year to date higher than the 5-year cumulative medians, while the incidence of only these two diseases and scarlet fever has been higher this year than last.

For the current week, 6 cases of Rocky Mountain spotted fever were reported (1 in Indiana and 5 (delayed reports) in Idaho), 4 cases of undulant fever (2 each in Connecticut and Mississippi), and 68 cases of endemic typhus fever (31 in Georgia and 11 in Texas).

The Bureau of the Census reports 7,764 deaths in 88 major cities of the United States for the current week, as compared with 7,776 for the preceding week, and with a 3-year (1937–39) average of 7,820 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended October 12, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Oct. 12, 1940	Oct. 14, 1939		Oct. 12, 1940	Oct. 14, 1939		Oct. 12, 1940	Oct. 14, 1939		Oct. 12, 1940	Oct. 14, 1939	
NEW ENG.												
Maine	2	2	1	---	---	1	24	2	8	0	0	0
New Hampshire	0	0	0	---	---	---	0	16	2	0	0	0
Vermont	0	1	1	---	---	---	5	6	5	0	0	0
Massachusetts	2	5	2	---	---	---	107	43	39	2	2	1
Rhode Island	0	0	0	---	---	---	0	7	4	0	0	0
Connecticut	1	1	2	1	---	---	3	9	9	0	1	1
MID. ATL.												
New York	12	16	21	[1] 7	[1] 2	[1] 6	99	45	66	3	2	7
New Jersey	12	13	10	1	12	8	60	10	10	0	1	1
Pennsylvania	16	20	35	---	---	---	93	24	48	1	5	3
E. NO. CEN.												
Ohio	15	44	39	9	24	22	6	21	21	2	1	2
Indiana [2]	5	21	22	2	---	17	9	11	11	2	1	2
Illinois	12	23	35	3	2	6	61	19	13	0	1	3
Michigan [3]	10	15	15	12	9	2	113	18	21	0	2	2
Wisconsin	3	1	8	27	25	25	105	13	21	1	4	1
W. NO. CEN.												
Minnesota	4	3	5	2	2	1	4	8	8	0	0	0
Iowa	3	11	7	---	---	---	11	7	4	0	1	1
Missouri	6	14	32	---	---	34	2	5	14	0	0	1
North Dakota	3	0	2	1	---	---	4	2	2	0	0	0
South Dakota	2	2	1	---	1	---	2	32	1	1	0	0
Nebraska	1	1	3	2	---	---	16	1	1	0	0	0
Kansas	5	2	7	3	3	1	7	26	3	1	2	0
SO. ATL.												
Delaware	0	1	1	---	---	---	4	1	2	0	0	0
Maryland [3]	4	8	8	2	11	7	5	6	4	0	0	2
Dist. of Col.	2	6	6	---	---	---	2	0	1	0	0	1
Virginia [4]	31	62	62	45	58	---	22	5	8	2	1	1
West Virginia [3]	7	21	21	2	11	10	5	2	2	0	0	2
North Carolina [4]	71	141	124	---	---	3	4	32	32	0	0	1
South Carolina [4]	20	39	24	168	216	166	2	3	3	0	0	1
Georgia [4]	28	49	48	14	16	---	3	7	0	1	2	0
Florida [4]	3	8	10	---	1	1	1	2	2	0	1	1
E. SO. CEN.												
Kentucky	7	20	26	2	3	9	12	14	15	1	0	1
Tennessee [4]	8	34	48	6	7	19	15	6	2	1	1	3
Alabama [4]	20	30	43	13	23	23	2	5	4	2	2	2
Mississippi [3, 4]	11	18	18	---	---	---	---	---	0	0	0	0
W. SO. CEN.												
Arkansas	16	19	29	14	17	17	2	1	1	0	0	0
Louisiana [4]	14	17	17	---	2	5	5	0	2	1	0	0
Oklahoma	16	10	11	38	43	28	5	0	1	1	1	1
Texas [3, 4]	22	34	58	195	140	64	11	37	15	0	2	1
MOUNTAIN												
Montana	1	15	2	20	---	21	17	65	22	0	0	0
Idaho [3]	0	0	0	5	1	4	3	7	7	0	0	0
Wyoming	1	0	0	---	---	---	1	21	3	0	0	0
Colorado	3	10	10	13	6	---	9	4	6	0	0	0
New Mexico	0	0	3	---	---	---	9	1	3	1	0	0
Arizona	1	4	4	65	40	27	21	0	1	0	0	0
Utah [3]	2	1	0	2	---	---	3	7	6	0	0	0
PACIFIC												
Washington	0	0	0	---	---	---	2	250	18	0	0	0
Oregon	6	0	0	15	7	13	11	10	5	0	0	0
California	16	11	25	16	5	17	57	42	42	0	1	1
Total	433	753	931	705	687	649	984	853	853	23	34	49
41 weeks	11,215	16,191	19,138	173,317	155,313	144,016	234,393	352,687	352,687	1,321	1,588	4,605

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 12, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Oct. 12, 1940	Oct. 14, 1939		Oct. 12, 1940	Oct. 14, 1939		Oct. 12, 1940	Oct. 14, 1939		Oct. 12, 1940	Oct. 14, 1939	
NEW ENG.												
Maine	0	1	1	0	2	8	0	0	0	2	2	2
New Hampshire	1	0	0	2	1	1	0	0	0	0	0	0
Vermont	1	5	0	7	7	7	0	0	0	0	0	0
Massachusetts	3	4	4	45	42	65	0	0	0	0	0	1
Rhode Island	1	0	0	2	3	9	0	0	0	0	0	0
Connecticut	0	4	4	10	18	20	0	0	0	0	4	1
MID. ATL.												
New York	8	61	20	107	124	139	0	0	0	14	20	20
New Jersey	2	9	9	38	48	46	0	0	0	5	3	4
Pennsylvania	13	34	7	85	161	165	0	0	0	14	20	27
E. NO. CEN.												
Ohio	88	6	6	93	171	210	0	0	0	7	8	21
Indiana [3]	31	5	4	33	59	94	2	2	2	4	6	6
Illinois	43	7	16	159	123	195	3	0	1	17	19	24
Michigan [3]	64	41	18	80	144	156	0	0	0	4	4	7
Wisconsin	25	9	7	89	74	90	0	1	1	0	1	1
W. NO. CEN.												
Minnesota	20	31	3	57	61	59	0	0	0	2	0	2
Iowa	75	12	5	24	56	56	1	0	2	2	2	6
Missouri	26	1	1	32	45	77	0	0	0	10	7	16
North Dakota	0	0	0	12	11	24	0	0	0	1	0	1
South Dakota	1	1	1	9	27	14	0	0	1	0	0	0
Nebraska	20	2	1	4	8	9	0	0	0	1	1	1
Kansas	24	2	2	62	51	61	1	0	0	2	8	4
SO. ATL.												
Delaware	0	0	0	2	7	7	0	0	0	0	0	1
Maryland [3]	0	3	2	27	30	30	0	0	0	5	4	12
Dist. of Col.	0	0	1	5	4	8	0	0	0	1	2	2
Virginia [4]	15	1	1	25	38	38	0	0	0	7	4	13
West Virginia [3]	37	2	1	31	68	68	0	0	0	5	5	12
North Carolina [4]	1	5	3	118	82	80	0	1	1	12	9	15
South Carolina [4]	0	11	0	54	20	10	0	0	0	5	10	11
Georgia [4]	1	1	2	42	45	31	0	0	0	11	8	8
Florida [4]	1	0	1	8	4	8	0	0	0	0	2	2
E. SO. CEN.												
Kentucky	6	13	4	55	62	62	0	0	0	15	14	20
Tennessee [4]	3	2	2	53	48	48	0	0	0	14	15	15
Alabama [4]	3	0	1	20	44	17	0	0	0	3	1	4
Mississippi [3] [4]	2	0	2	8	19	19	0	0	0	1	4	5
W. SO. CEN.												
Arkansas	1	1	1	15	9	15	0	1	0	15	9	9
Louisiana [4]	3	0	1	7	14	11	0	0	0	8	8	8
Oklahoma	4	2	0	28	10	19	0	2	1	5	22	12
Texas [3] [4]	4	8	2	32	31	37	1	0	0	17	27	27
MOUNTAIN												
Montana	3	0	0	12	24	24	1	0	4	1	3	3
Idaho [3]	2	4	0	13	11	17	0	0	0	10	0	3
Wyoming	0	2	0	4	5	5	0	0	0	1	1	0
Colorado	0	11	3	11	22	20	0	1	0	0	8	8
New Mexico	0	19	2	3	8	9	0	0	0	3	7	12
Arizona	2	7	0	4	4	5	0	0	0	1	2	3
Utah [3]	3	11	1	3	10	11	0	0	0	0	0	0
PACIFIC												
Washington	18	1	1	28	34	33	0	0	4	3	2	8
Oregon	1	5	2	7	10	25	1	0	0	2	1	1
California	10	30	25	89	82	123	0	3	1	6	18	13
Total	516	374	306	1,654	1,981	2,416	10	11	42	236	291	415
41 weeks	7,434	5,664	5,673	127,266	126,278	177,590	2,046	8,857	8,456	7,929	10,725	11,960

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 12, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended Oct. 12, 1940	Whooping cough, Week ended Oct. 14, 1939
NEW ENG.		
Maine	5	78
New Hampshire	0	0
Vermont	4	19
Massachusetts	110	82
Rhode Island	3	5
Connecticut	65	69
MID. ATL.		
New York	281	234
New Jersey	78	87
Pennsylvania	381	202
E. NO. CEN.		
Ohio	206	234
Indiana [2]	12	54
Illinois	139	179
Michigan [3]	348	111
Wisconsin	95	139
W. NO. CEN.		
Minnesota	36	67
Iowa	11	12
Missouri	26	10
North Dakota	23	6
South Dakota	2	5
Nebraska	2	1
Kansas	30	7
SO. ATL.		
Delaware	14	3
Maryland [3]	51	23
Dist. of Col.	4	26
Virginia [4]	40	20
West Virginia [3]	25	17
North Carolina [4]	65	55
South Carolina [4]	12	19
Georgia [4]	8	9
Florida [4]	9	2
E. SO. CENT.		
Kentucky	37	45
Tennessee [4]	32	28
Alabama [4]	12	19
Mississippi [3 4]	----------	----------
W. SO. CENT.		
Arkansas	29	18
Louisiana [4]	2	52
Oklahoma	15	2
Texas [3 4]	90	86
MOUNTAIN		
Montana	0	8
Idaho [2]	1	3
Wyoming	2	0
Colorado	19	10
New Mexico	4	20
Arizona	2	7
Utah [3]	8	58
PACIFIC		
Washington	12	11
Oregon	2	16
California	248	83
Total	2,600	2,191
41 weeks	128,172	145,873

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended October 12, 1940, 6 cases as follows: Indiana, 1; Idaho (delayed report), 5.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Oct. 12, 1940, 68 cases as follows: Virginia, 1; North Carolina, 2; South Carolina, 6; Georgia, 31; Florida, 1; Tennessee, 3; Alabama, 5; Mississippi, 1; Louisiana, 7; Texas, 11.

VENEREAL DISEASES

New Cases Reported for July 1940[1]

Reports from States

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis[2]					
	Primary and secondary	Early-latent[3]	Rate per 10,000 population	Includes late-latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Alabama	289	310	2.05	286	0.98	74	0.25	1,467	5.01	510	1.74	16	0.05
Alaska[4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Arizona	23	10	.79	87	.89	8	.19	81	1.94	147	3.52	6	.14
Arkansas	250	284	2.57	402	1.94	30	.14	1,119	5.39	203	.98	11	.05
California	34	374	.65	1,241	1.98	80	.13	1,853	2.96	1,863	2.98	35	.06
Colorado	131	------	1.22	827	3.04	50	.46	508	4.72	140	1.30	2	.02
Connecticut	17	11	.16	77	.44	8	.05	146	.83	112	.64	------	------
Delaware	9	25	1.29	25	.95	2	.08	156	5.93	61	2.32	1	.04
District of Columbia	------	------	------	------	------	------	------	572	8.99	353	5.55	3	.05
Florida	240	369	3.58	718	4.23	45	.26	1,400	8.24	111	.65	15	.09
Georgia	------	1,271	4.08	645	2.07	------	------	1,916	6.15	102	.33	4	.01
Hawaii	4	1	.12	37	.91	5	.12	64	1.58	74	1.83	------	------
Idaho	4	------	.08	11	.22	2	.04	18	.36	10	.20	------	------
Illinois	130	356	.61	1,372	1.73	75	.09	1,933	2.44	1,674	2.11	20	.03
Indiana	93	58	.43	236	.68	28	.08	528	1.51	154	.44	1	.003
Iowa	50	68	.46	119	.46	6	.02	256	1.00	176	.60	------	------
Kansas	63	49	.60	77	.41	14	.08	261	1.40	120	.64	------	------
Kentucky	64	35	.33	204	.69	7	.02	469	1.58	261	.88	1	.003
Louisiana	447	3	2.10	3	.01	2	.01	938	4.37	103	.48	12	.06
Maine	17	------	.20	25	.29	9	.10	52	.60	28	.33	------	------
Maryland	93	28	.72	199	1.18	21	.12	825	4.90	261	1.55	20	.12
Massachusetts	48	------	.11	354	.80	22	.05	424	.96	335	.76	------	------
Michigan	113	114	.47	481	.99	43	.09	862	1.77	703	1.44	30	.06
Minnesota	19	17	.13	169	.63	7	.03	217	.81	181	.68	1	.004
Mississippi	260	801	5.20	831	4.07	116	.57	5,296	25.96	2,701	13.24	3	.01
Missouri	141	365	1.20	234	.58	27	.07	801	1.90	289	.72	5	.01
Montana	10	1	.20	27	.49	2	.04	45	.82	26	.48	------	------
Nebraska	14	7	.15	52	.38	2	.01	75	.55	47	.34	------	------
Nevada	2	6	.78	10	.98	1	.10	19	1.86	21	2.06	1	.10
New Hampshire	------	1	.02	3	.06	3	.06	12	.23	7	.14	------	------
New Jersey	92	155	.57	450	1.03	51	.12	758	1.74	246	.56	45	.10
New Mexico	9	10	.45	95	2.25	11	.26	125	2.96	46	1.09	3	.07
New York	124	259	.29	2,067	1.59	119	.09	2,759	2.12	1,209	.93	34	.03
North Carolina	230	902	3.21	692	1.96	126	.36	1,951	5.53	555	1.57	57	.16
North Dakota	7	5	.17	9	.13	8	.11	45	.63	28	.39	------	------
Ohio	232	262	.73	765	1.13	67	.10	1,326	1.96	176	.26	4	.01
Oklahoma	87	99	.72	182	.71	26	.10	602	2.34	334	1.30	------	------
Oregon	19	22	.39	64	.62	3	.03	110	1.06	124	1.19	------	------
Pennsylvania	178	434	.60	594	.58	60	.06	1,266	1.24	------	------	------	------
Rhode Island	14	1	.22	71	1.04	5	.07	91	1.33	37	.54	------	------
South Carolina	617	369	5.21	737	3.90	27	.14	1,774	9.38	112	.59	13	.07
South Dakota	14	37	.74	14	.20	2	.03	69	1.00	25	.36	------	------
Tennessee	260	473	2.51	688	2.35	41	.14	1,469	5.02	351	1.20	15	.05
Texas	302	463	1.23	790	1.27	112	.18	1,874	3.01	881	1.41	39	.06
Utah	11	6	.33	55	1.05	2	.04	77	1.48	37	.71	------	------
Vermont	2	5	.18	3	.08	2	.05	12	.31	20	.52	------	------
Virginia	351	324	2.46	693	2.53	62	.23	1,534	5.59	331	1.21	------	------
Washington	36	36	.43	79	.47	9	.05	178	1.06	235	1.40	4	.02
West Virginia	84	49	.70	85	.45	15	.08	511	2.69	220	1.16	------	------
Wisconsin	40	------	.14	76	.26	5	.02	121	.41	87	.30	------	------
Wyoming	16	5	.89	23	.97	8	.13	54	2.28	34	1.43	2	.08
Puerto Rico[4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Virgin Islands[4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Total	5,290	8,480	1.06	16,434	1.26	1,445	.11	39,019	2.99	15,861	1.32	409	.04

See footnotes at end of table.

VENERAEL DISEASES—Continued

New Cases Reported for July 1940—Continued

Reports from cities of 200,000 population or over

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis [2]					
	Primary and secondary	Early-latent [3]	Rate per 10,000 population	Includes late-latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Akron	7	9	0.58	31	1.13	4	0.15	51	1.85	32	1.16	1	0.04
Atlanta	------	273	0.09	24	.80	------	------	397	13.22	14	.47	4	.13
Baltimore	75	14	1.07	149	1.78	7	.08	489	5.85	145	1.74	19	.23
Birmingham	74	62	4.62	59	2.00	13	.44	390	13.25	54	1.83	3	.10
Boston	18	------	.23	102	1.28	4	.05	138	1.74	113	1.42	------	------
Buffalo	6	3	.15	87	1.45	5	.08	101	1.68	66	1.10	------	------
Chicago	92	201	.80	820	2.24	45	.12	1,158	3.16	1,142	3.12	25	.07
Cincinnati [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Cleveland	48	53	1.07	144	1.52	11	.12	250	2.71	173	1.83	6	.06
Columbus	17	15	1.02	57	1.82	4	.13	78	2.49	25	.80	------	------
Dallas [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Dayton	13	12	1.13	35	1.58	2	.09	63	2.84	32	1.44	2	.09
Denver	------	------	------	------	------	------	------	190	6.31	84	2.79	------	------
Detroit	38	56	.52	236	1.30	11	.06	341	1.88	336	1.85	23	.13
Houston	52	64	3.24	177	4.91	27	.75	391	10.91	192	5.36	7	.20
Indianapolis	14	5	.49	17	.44	2	.05	96	2.49	35	.91	------	------
Jersey City	7	8	.46	27	.83	3	.09	45	1.39	7	.22	1	.03
Kansas City [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Los Angeles	------	93	.61	301	2.37	16	.11	470	3.00	408	2.68	6	.04
Louisville	10	6	.47	78	2.30	3	.09	150	4.43	155	4.57	------	------
Memphis [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Milwaukee	14	------	.22	32	.51	2	.03	48	.76	12	.19	12	.19
Minneapolis	12	8	.40	45	.90	------	------	65	1.30	53	1.06	1	.02
Newark	38	7	.99	170	3.74	12	.26	227	5.00	86	1.89	2	.04
New Orleans [4]	------	------	------	------	------	------	------	------	------	------	------	------	------
New York	149	257	.54	1,426	1.90	79	.11	2,081	2.78	1,101	1.47	55	.07
Oakland	2	9	.35	43	1.37	1	.03	55	1.76	44	1.41	1	.03
Omaha	6	2	.36	6	.27	1	.04	15	.67	6	.27	------	------
Philadelphia	63	178	1.20	812	1.56	20	1.10	573	2.86	42	.21	------	------
Pittsburgh	------	------	------	------	------	------	------	494	7.01	28	.40	------	------
Portland	8	14	.69	42	1.31	2	.06	66	2.06	69	2.15	------	------
Providence	2	------	.08	47	1.81	1	.04	50	1.93	25	.96	------	------
Rochester	2	------	.06	28	.82	------	------	30	.88	32	.94	------	------
St. Louis	84	182	2.56	326	3.87	17	.20	559	6.63	210	2.49	9	.11
St. Paul	1	2	.10	20	.70	2	.07	26	.90	14	.49	------	------
San Antonio	4	45	1.87	102	3.90	18	.69	196	7.49	97	3.71	1	.04
San Francisco	45	2	.68	143	2.08	4	.06	194	2.82	216	3.13	7	.10
Seattle	22	20	1.08	60	1.55	5	.13	113	2.92	169	4.37	3	.08
Syracuse	------	------	------	68	3.02	6	.27	74	3.28	8	.35	------	------
Toledo	4	6	.32	35	1.13	2	.06	47	1.51	30	.96	------	------
Washington	------	------	------	------	------	------	------	569	8.95	353	5.55	3	.05
Total	977	1,606	.91	5,309	1.86	329	.12	10,286	3.41	5,608	1.86	191	.08

[1] Figures preliminary and subject to correction.
[2] Includes "not stated" diagnosis.
[3] Duration of infection under 4 years.
[4] No report for current month.

WEEKLY REPORTS FROM CITIES

City reports for week ended September 28, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Data for 90 cities:											
5-year average	134	52	16	162	336	448	2	324	67	966	--------
Current week [1]	45	39	11	229	243	337	0	313	40	1,003	--------
Maine:											
Portland	0	------	0	0	1	0	0	0	0	5	15
New Hampshire:											
Concord	0	------	0	0	0	1	0	0	0	0	8
Manchester	0	------	0	0	2	5	0	1	0	0	10
Nashua	0	------	0	0	0	0	0	0	0	0	6
Vermont:											
Barre	0	------	0	0	0	0	0	1	0	0	2
Burlington	0	------	0	0	0	0	0	0	0	0	9
Rutland	0	------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	0	------	0	15	8	5	0	9	0	64	207
Fall River	0	------	0	1	2	0	0	3	0	3	27
Springfield	0	------	0	0	1	2	0	1	0	0	24
Worcester	0	------	0	23	4	0	0	0	0	1	43
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	21
Providence	0	------	0	0	1	1	0	2	0	2	46
Connecticut:											
Bridgeport	0	------	0	0	0	0	0	0	0	1	31
Hartford	0	------	0	0	8	1	0	1	0	4	86
New Haven	0	------	0	0	0	2	0	0	0	9	43
New York:											
Buffalo	0	------	0	1	3	3	0	7	0	9	121
New York	11	8	2	34	48	29	0	53	5	117	1,345
Rochester	0	------	0	1	1	1	0	2	1	8	63
Syracuse	0	------	0	0	1	1	0	1	0	7	43
New Jersey:											
Camden	0	------	0	7	0	3	0	0	0	2	24
Newark	0	------	0	12	3	5	0	7	0	27	92
Trenton	0	------	0	0	2	2	0	1	1	1	30
Pennsylvania:											
Philadelphia	0	3	1	41	5	24	0	20	2	57	408
Pittsburgh	1	2	1	2	10	8	0	3	2	23	150
Reading	0	------	0	2	0	0	0	3	1	16	15
Scranton	0	------	--------	0	-------	2	0	-------	0	0	--------
Ohio:											
Cincinnati	1	------	0	0	5	10	0	2	0	15	104
Cleveland	0	6	1	1	5	7	0	5	1	48	156
Columbus	0	------	0	0	0	2	0	2	1	5	82
Toledo	0	------	0	2	4	6	0	3	1	9	69
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	0	12
Fort Wayne	0	------	--------	0	-------	0	0	-------	0	0	--------
Indianapolis	0	------	0	1	2	6	0	7	0	10	92
Muncie	0	------	0	0	1	0	0	1	0	0	16
South Bend	0	------	0	0	2	0	0	0	0	0	11
Terre Haute	0	------	0	0	1	0	0	0	0	0	13
Illinois:											
Alton	0	------	0	0	0	4	0	1	0	2	16
Chicago	4	1	1	15	19	49	0	23	3	73	592
Elgin	0	------	0	1	0	0	0	0	0	1	9
Springfield	0	------	0	0	0	3	0	0	0	2	20
Michigan:											
Detroit	4	------	0	20	6	32	0	16	0	147	204
Flint	0	------	0	0	5	2	0	0	0	4	34
Grand Rapids	0	------	0	0	0	1	0	0	0	32	27
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	0	8
Madison	0	------	0	4	0	2	0	0	0	3	12
Milwaukee	0	------	0	28	2	14	0	0	0	8	101
Racine	1	------	0	0	0	1	0	1	0	2	16
Superior	0	------	0	0	0	3	0	0	0	1	9
Minnesota:											
Duluth	0	------	0	0	0	1	0	0	0	0	21
Minneapolis	1	------	0	1	5	12	0	1	1	16	101
St. Paul	0	------	0	0	6	3	0	1	0	10	47

[1] Figures for Raleigh, Winston-Salem, and Boise estimated; reports not received.

City reports for week ended September 28, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Iowa:											
Cedar Rapids	0	-----	-----	0	-----	2	0	-----	0	0	-----
Davenport	0	-----	-----	0	-----	0	0	-----	0	0	-----
Des Moines	1	-----	0	0	0	9	0	0	2	1	30
Sioux City	0	-----	-----	0	-----	0	0	-----	0	0	-----
Waterloo	0	-----	-----	0	-----	0	0	-----	1	1	-----
Missouri:											
Kansas City	1	-----	0	0	1	1	0	3	0	5	65
St. Joseph	0	-----	0	0	2	0	0	1	0	1	16
St. Louis	1	-----	0	1	9	9	0	8	3	13	210
North Dakota:											
Fargo	0	-----	0	0	1	0	0	0	0	1	5
Grand Forks	0	-----	-----	0	-----	0	0	-----	0	1	-----
Minot	0	-----	0	0	0	0	0	0	0	0	8
South Dakota:											
Aberdeen	0	-----	-----	0	-----	0	0	-----	0	2	-----
Nebraska:											
Lincoln	0	-----	-----	1	-----	0	0	-----	0	3	-----
Omaha	0	-----	0	1	2	2	0	1	0	1	41
Kansas:											
Lawrence	0	-----	0	0	0	0	0	0	0	0	2
Topeka	1	-----	0	0	0	6	0	1	0	0	12
Wichita	0	-----	0	0	0	3	0	0	0	4	17
Delaware:											
Wilmington	0	-----	0	0	3	0	0	1	0	6	24
Maryland:											
Baltimore	0	-----	0	0	7	8	0	13	1	62	175
Cumberland	0	1	0	0	0	0	0	0	0	0	17
Frederick	0	-----	0	0	1	0	0	0	0	0	6
Dist. of Col.:											
Washington	2	-----	0	2	6	11	0	15	1	2	159
Virginia:											
Lynchburg	2	-----	0	0	1	1	0	0	0	0	15
Norfolk	0	-----	0	0	1	1	0	0	3	0	23
Richmond	0	-----	0	1	2	4	0	3	0	2	58
Roanoke	0	-----	0	0	1	2	0	0	0	5	19
West Virginia:											
Charleston	0	-----	0	0	2	0	0	1	0	0	30
Huntington	2	-----	-----	0	-----	1	0	-----	0	0	-----
Wheeling	0	-----	0	0	1	0	0	1	0	0	24
North Carolina:											
Gastonia	0	-----	-----	0	-----	0	0	-----	0	1	-----
Raleigh	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Wilmington	0	-----	0	0	0	1	0	0	0	0	12
Winston-Salem	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
South Carolina:											
Charleston	0	1	0	0	0	1	0	0	1	2	23
Florence	0	-----	0	0	1	0	0	0	0	0	10
Greenville	0	-----	0	0	0	0	0	0	0	1	4
Georgia:											
Atlanta	0	5	0	1	2	4	0	6	1	0	61
Brunswick	0	-----	0	0	0	0	0	0	0	0	5
Savannah	0	4	1	0	0	0	0	1	0	0	25
Florida:											
Miami	1	4	0	0	3	0	0	2	0	0	27
Tampa	0	1	1	0	1	0	0	1	0	0	25
Kentucky:											
Ashland	0	-----	0	0	0	0	0	0	1	0	7
Covington	0	-----	0	0	1	9	0	0	0	0	13
Lexington	0	-----	0	1	0	0	0	1	0	6	13
Louisville	1	-----	0	0	2	7	0	4	0	8	82
Tennessee:											
Knoxville	1	-----	0	0	0	1	0	3	0	1	21
Memphis	0	-----	0	0	2	2	0	3	1	8	88
Nashville	0	-----	0	0	3	2	0	1	0	5	47
Alabama:											
Birmingham	3	-----	1	0	2	3	0	3	2	2	64
Mobile	0	-----	0	0	0	1	0	3	0	0	31
Montgomery	0	-----	-----	1	-----	2	0	-----	0	0	-----
Arkansas:											
Fort Smith	0	-----	-----	0	-----	0	0	-----	0	0	-----
Little Rock	0	-----	1	0	2	0	0	7	0	1	-----
Louisiana:											
New Orleans	0	-----	0	1	8	1	0	9	5	2	112
Shreveport	1	-----	0	0	4	0	0	1	4	1	50
Oklahoma:											
Oklahoma City	0	-----	0	1	3	2	0	0	0	0	20
Tulsa	0	-----	0	0	0	2	0	0	0	0	20

City reports for week ended September 28, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Texas:											
Dallas	3	------	0	0	0	1	0	4	1	5	46
Fort Worth	0	------	0	1	1	2	0	2	0	2	44
Galveston	0	------	0	0	0	0	0	1	0	0	15
Houston	2	------	0	1	2	3	0	4	0	0	70
San Antonio	1	------	0	0	2	1	0	6	1	1	52
Montana:											
Billings	0	------	0	2	1	3	0	0	0	0	8
Great Falls	0	------	0	0	1	1	0	0	0	2	4
Helena	0	------	0	0	0	3	0	0	0	0	2
Missoula	0	------	0	0	1	1	0	0	0	0	--------
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	--------
Colorado:											
Colorado Springs	0	------	0	0	0	0	0	0	0	2	4
Denver	0	------	0	2	4	3	0	5	0	4	64
Pueblo	0	------	0	0	0	2	0	1	0	0	6
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	1	0	0	18
Utah:											
Salt Lake City	0	------	0	2	0	1	0	0	0	9	84
Washington:											
Seattle	3	------	1	1	3	3	0	5	0	9	86
Spokane	0	------	0	0	0	0	0	0	0	0	31
Tacoma	0	------	0	0	1	0	0	1	0	0	30
Oregon:											
Portland	0	2	0	0	2	5	0	0	0	5	71
Salem	0	------	--------	0	------	0	0	------	0	0	--------
California:											
Los Angeles	2	7	0	2	5	12	0	15	0	60	323
Sacramento	0	------	0	0	4	3	0	5	1	0	29
San Francisco	0	------	0	7	4	2	0	6	0	47	159

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Massachusetts:			
Springfield	0	0	1
Worcester	0	0	1
Rhode Island:			
Pawtucket	1	1	0
New York:			
Buffalo	2	0	3
New York	1	0	12
Pennsylvania:			
Philadelphia	0	0	5
Pittsburgh	0	0	1
Ohio:			
Cincinnati	0	0	5
Cleveland	0	0	5
Columbus	0	0	1
Indiana:			
Fort Wayne	0	0	5
Indianapolis	0	0	1
Muncie	0	0	2
South Bend	0	0	1
Illinois:			
Chicago	0	0	21
Michigan:			
Detroit	0	0	4
Flint	1	0	0
Grand Rapids	0	0	6
Wisconsin:			
Madison	0	0	3
Milwaukee	0	0	2
Superior	0	0	1
Minnesota:			
Minneapolis	0	0	1
St. Paul	0	0	2
Iowa:			
Davenport	0	0	2
Des Moines	0	0	7

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
Iowa—Continued:			
Sioux City	0	0	4
Waterloo	0	0	3
Missouri:			
Kansas City	0	0	5
St. Joseph	0	0	5
St. Louis	0	0	1
Nebraska:			
Omaha	0	0	1
Kansas:			
Topeka	0	0	5
Wichita	0	0	1
Maryland:			
Baltimore	1	0	0
Virginia:			
Lynchburg	0	0	1
Richmond	0	1	2
Roanoke	0	0	1
West Virginia:			
Charleston	1	0	1
Arkansas:			
Little Rock	0	0	1
Louisiana:			
New Orleans	0	0	2
Texas:			
Dallas	0	0	1
Houston	0	0	2
Montana:			
Billings	0	0	1
Washington:			
Seattle	0	0	3
Tacoma	0	0	1
California:			
Los Angeles	1	0	4
San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Grand Rapids, 1; Sacramento, 1.

Pellagra cases.—Charleston, S. C., 3; Savannah, 3; Montgomery, 1; Fort Smith, 1.

Typhus fever.—Cases: Charleston, S. C., 1; Savannah, 1; Miami, 1; Birmingham, 1; Dallas, 3; Houston, 6. Deaths: Little Rock, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 31, 1940.—During the week ended August 31, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					3			1		4
Chickenpox		2		47	25	7	40		9	130
Diphtheria			1	14	3	3	4	4		29
Influenza		11			4				3	18
Lethargic encephalitis					1					1
Measles	6		1	9	65	11	18	1	11	122
Mumps			1		51		4	2		58
Pneumonia		1			6				9	16
Poliomyelitis				5	1		1			7
Scarlet fever		3	2	81	62	8	6	11	12	185
Tuberculosis	1	7	6	61	64	3		1		143
Typhoid and paratyphoid fever		3	3	14	8	1	1	1	3	34
Whooping cough		1	14	141	57	20	26	2	11	272

NEWFOUNDLAND AND LABRADOR

Vital statistics—Year 1938.—Following are vital statistics for Newfoundland and Labrador for the year 1938:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Population	296,092		Deaths from—Continued.		
Marriages	2,172	7.3	Influenza	33	
Births	7,343	24.8	Measles	23	
Deaths	3,586	12.1	Nephritis	96	
Deaths under 1 year of age	681	[1] 92.8	Pneumonia (all forms)	219	
Deaths from:			Puerperal causes	45	[1] 6.1
Appendicitis	11		Scarlet fever	6	
Cancer	248	.838	Senility	395	
Cerebrospinal meningitis	50		Syphilis	13	
Cirrhosis of the liver	8		Tuberculosis (all forms)	597	1.98
Diphtheria	5		Typhoid fever	11	
Gastroenteritis	168		Violence	145	

[1] Per 1,000 live births.

YUGOSLAVIA

Notifiable diseases—4 weeks ended August 11, 1940.—During the 4 weeks ended August 11, 1940, certain notifiable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	48	10	Paratyphoid fever	42	
Cerebrospinal meningitis	80	29	Poliomyelitis	8	1
Diphtheria and croup	400	22	Scarlet fever	155	8
Dysentery	115	6	Sepsis	6	6
Erysipelas	111	8	Tetanus	53	18
Favus	5		Typhoid fever	284	24
Lethargic encephalitis	7	1	Typhus fever	32	1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of September 27, 1940, pages 1796–1799. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China.—During the week ended September 28, 1940, cholera was reported in China as follows: Hong Kong, 68 cases; Macao, 70 cases; Shanghai, 16 cases.

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Public Health Reports

VOLUME 55 OCTOBER 25, 1940 NUMBER 43

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

Vol. 55 • OCTOBER 25, 1940 • *No. 43*

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

September 8–October 5, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended October 5, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

DISEASES ABOVE MEDIAN PREVALENCE

Poliomyelitis.—A total of 2,859 cases of poliomyelitis was reported for the 4 weeks ended October 5, as compared with 2,376 cases during the preceding 4-week period. However, during the current 4-week period the number of cases dropped from 797 for the first week of the period to 555 cases for the last week (ended October 5). Compared with recent years the number of cases for the country as a whole was about 1.6 times the number (1,844) recorded for the corresponding period in 1939, which number also represents the 1935–39 median incidence for this period.

While each section of the country except the North Atlantic reported a relatively high incidence, the disease still remained most prevalent in the North Central and South Atlantic regions. States in those regions reporting a particularly high incidence were: Michigan, 431; Iowa, 392; West Virginia, 226; Illinois, 213; Ohio, 195; Indiana and Kansas, 174 each; Wisconsin, 131; Missouri, 120; and Virginia, 82 cases. Approximately 2,100 of the total number of cases occurred in those 10 States. Practically all of these States, as well as other States, reported significant declines during the last week of the period under consideration, and as the peak of this disease has usually been passed by this time still further declines may be expected.

Influenza.—The number of cases of influenza (2,165) reported for the 4 weeks ended October 5 represented an increase of about 25 percent over the preceding 4-week period. In relation to preceding years the current incidence was about 20 percent in excess of the incidence during the corresponding period in 1939 and about 10 percent in excess of the average seasonal incidence. The disease was relatively most prevalent in the South Central and Mountain regions.

Measles.—For the current period there were 2,816 cases of measles reported, as compared with 2,128, 3,033, and 3,081 cases for the corresponding period in 1939, 1938, and 1937, respectively. Compared with the experience of recent years the incidence was relatively high in all regions except the South Atlantic, West South Central, and Pacific regions.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Sept. 8–Oct. 5, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	1,316	2,296	2,849	2,165	1,835	1,955	2,816	2,128	2,306	107	103	212
New England	16	32	32	9	4	11	333	201	201	11	4	7
Middle Atlantic	95	113	157	28	34	55	769	281	389	25	17	44
East North Central	138	224	367	204	222	222	684	257	410	19	17	35
West North Central	83	113	160	41	53	123	177	141	158	9	9	10
South Atlantic	406	971	971	790	781	768	151	117	158	15	23	30
East South Central	196	431	485	256	115	156	191	88	104	10	11	25
West South Central	240	290	329	531	361	361	92	169	110	8	10	10
Mountain	49	64	75	205	187	101	208	160	160	3	9	7
Pacific	93	58	122	101	78	105	211	654	595	7	3	8
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	2,859	1,844	1,844	4,808	5,357	6,621	48	125	125	1,444	1,692	2,211
New England	26	47	47	218	215	322	0	0	0	21	31	38
Middle Atlantic	120	678	458	796	816	966	0	0	0	155	173	269
East North Central	1,147	342	342	1,439	1,576	2,148	9	35	25	158	379	379
West North Central	808	270	87	519	680	854	30	29	34	124	108	166
South Atlantic	348	78	83	620	790	839	0	9	4	297	273	359
East South Central	78	39	57	474	456	456	2	1	7	222	179	233
West South Central	76	65	20	186	181	212	3	14	9	339	385	385
Mountain	71	139	53	172	202	271	2	27	38	79	72	138
Pacific	125	186	109	375	441	512	2	10	19	49	92	92

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended October 5 there were 1,316 cases of diphtheria reported, as compared with 2,296, 3,309, and 2,849 cases for the corresponding period in 1939, 1938, and 1937, respectively. The incidence for the country as a whole and for each geographic region, except the Mountain and Pacific, was the lowest on record for this period.

Meningococcus meningitis.—The incidence of meningococcus meningitis was slightly above the incidence for the corresponding period in 1939, but the number of cases (107) was only about 50 percent of the 1935–39 median figure for this period. The New England region reported a slightly higher incidence than might be expected, the West North Central, West South Central, and Pacific regions about the average seasonal incidence, while in other regions the incidence was relatively low.

Scarlet fever.—All geographic regions showed an increase in scarlet fever during the 4-week period ended October 5. The increase amounted to about 90 percent over the preceding 4-week period. The number of cases (4,808), however, was only about 90 percent of the number recorded for the corresponding period in 1939 and less than 75 percent of the 1935–39 median incidence. All regions shared in the lower incidence except the East South Central, where a slight increase over the seasonal expectancy occurred.

Smallpox.—The incidence of smallpox was the lowest recorded for this period in the 12 years for which these data are available. Reported cases numbered 48, as compared with 125, 157, and 232 for the corresponding period in 1939, 1938, and 1937, respectively. The situation was favorable in all sections of the country.

Typhoid fever.—Reports indicate that typhoid fever was less prevalent than at the same time last year and the number of cases (1,444) reported for the 4 weeks ended October 5 was only about 70 percent of the 1935–39 median incidence for this period. All sections of the country shared in the favorable situation of the disease that now exists. The incidence reported for the country as a whole, as well as for some geographic regions, was the lowest on record for this period.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended October 5, based on data received from the Bureau of the Census, was 10.6 per 1,000 inhabitants (annual basis). The rate for the corresponding period in 1939 was also 10.6 and the average rate in the years 1935–39 was 10.3.

AN INSTITUTIONAL OUTBREAK OF PNEUMONITIS [1]

I. EPIDEMIOLOGICAL AND CLINICAL STUDIES

By J. W. Hornibrook, *Passed Assistant Surgeon*, and K. R. Nelson, *Surgeon*, *United States Public Health Service*

During the spring of 1940, 15 cases of pneumonitis occurred among the 153 employees in one building of the National Institute of Health in Washington, D. C. These 15 cases all showed a pneumonic shadow or shadows on roentgenograms. In addition to these cases, there were a few others of a somewhat similar but milder type which either gave negative X-ray findings or on which roentgenograms were not obtained.

EPIDEMIOLOGICAL DATA

Table 1 shows certain epidemiological data regarding these 15 cases. It is noted that onset of two of them occurred at the end of March. After an 11-day period cases appeared at intervals of 2 to 3 days throughout April. The next case developed 12 days later and the last case 6 days following this. Not much significance can be attached to the absence of cases between March 27 and April 11 because other illnesses developed in this period which, since they were not too similar clinically, especially in regard to severity, were not examined by X-ray. However, beginning about the middle of April, with the accumulation of clinical experience with the disease, all cases of illness which might reasonably be expected to belong to the group were examined by X-ray. The absence of recorded onsets between April 29 and May 11, and between May 11 and May 17, may, therefore, be taken as a real absence of new cases in these periods.

If it is assumed that the disease was spread by contact and that there were no inapparent infections, a long incubation period is suggested by these facts. On the other hand, if the infection was a place infection it would appear that its sources, or the agents responsible for its transfer, diminished rapidly in numbers beginning late in April, or that the number of persons susceptible was becoming exhausted in this period.

The Washington laboratories of the National Institute of Health comprise three buildings, the North, Central, and South, with a total of 233 persons, 25 of whom are employed in the North Building, 55 in the Central Building, and 153 in the South Building. No cases occurred in the North or Central Buildings which are occupied by the Divisions of Chemistry and of Pharmacology. Similarly, no proved cases occurred in the personnel of that part of the Institute located in Bethesda, Md., though there was daily contact between some employees of the two branches. All of the proved cases of pneumonitis occurred in the South Building which houses the Divisions of Biologics Control, Infectious Diseases, Pathology, and Zoology.

[1] From the Division of Infectious Diseases, National Institute of Health.

TABLE 1.—*Data on 15 patients with pneumonitis*

Cases	Sex	Age	Duties	Date of onset, 1940	Kind of animal handled	Where lunch obtained	Where lunch eaten
E. M.	M	40	Laboratory Assistant	Mar. 27	Rats, guinea pigs, rabbits	Media room	Media room.
H. D.	M	40	Cleaner	Mar. 31	Feeds all animals	do	Locker room.
C. P.	M	25	do	Apr. 11	do	do	Do.
L. B.	M	50	Control of arsenicals	Apr. 12	Rats, guinea pigs, rabbits	Home, occasionally media room	Own room, occasionally media room.
I. N.	M	34	Laboratory Assistant	Apr. 13	Mice, cotton rats, rabbits, monkeys	Media room	Media room.
T. P.	M	45	Control of arsenicals	Apr. 15	Rats, guinea pigs, rabbits	Home	Own room.
R. R.	M	40	Laboratory Assistant	Apr. 17	None	Media room	Media room.
A. M.	M	59	Incinerator	do	All animals (dead)	do	Locker room.
B. P.	M	33	Chemist	Apr. 18	None	do	Own room.
C. A.	M	53	Research, virus diseases	Apr. 19	Mice, cotton rats, rabbits, monkeys	Home	Do.
R. P.	F	51	Laboratory Assistant	Apr. 22	Mice	do	Own room; outside.
E. T.	M	50	Chemist	Apr. 25	None	do	Own room.
C. L.	M	31	Research, Weil's disease	Apr. 29	Rabbits, guinea pigs, cats, ferrets	Media room	Group lunchroom (about 18 persons).
W. P.	M	30	Laboratory Assistant	May 11	Guinea pigs	Media room and home	Own room, media room.
J. F.	M	40	Dishwasher (glassware)	May 17	None	Home	Locker room.

The distribution of personnel and of cases, by floors, was as follows:

Basement	34 employees	4 cases.
First floor	39 employees	0 cases.
Second floor	41 employees	4 cases.
Third floor	39 employees	7 cases

Figure 1 shows a plan of the South Building giving the approximate location where each of the patients was primarily engaged. It will be observed that the infection was fairly widespread throughout the building, though the entire first floor and the east wing of the second floor were not involved. Seven rooms on the first floor are used as administrative offices, and nearly one-half of this floor is occupied by the Division of Zoology; the remainder of this floor is given over to laboratory work on infectious diseases and in biologics control

It should be noted that patients H. D. and C. P., who are indicated as basement employees, spend nearly all their time cleaning and sweeping throughout the building and cleaning animal cages. Patient A. M. operated the incinerator and came into contact with all the floor sweepings, wastepaper basket contents, and cage cleanings from the entire building. Patient J. F. spent his entire time in the basement cleaning room where all used glassware is sent for cleaning, wrapping, and sterilization. All glassware contaminated with infectious matter is sterilized prior to delivery to the glass-washing room; thus, all cases had duties on the second or third floors or came in contact with materials recently recovered from those floors. In general, all employees move freely about the building.

In view of the identity of the infectious agent responsible for these cases (to be discussed in the following paper), it should be noted here that no case of the disease was recognized in any employee in the wing of the building (fig. 1, rickettsial diseases) where work with this agent has been in progress since the spring of 1938.

The employees consume their noon-day lunch at various places in the building; some bring prepared lunches, others purchase sandwiches and other food prepared, in part, in the media room. A careful study showed no correlation between sources of food or places of consumption and development of the disease, nor was there any reason to believe that the water supply was implicated in any manner.

The age and sex of each of the 15 cases is given in table 1. Since the exposed group is composed entirely of adults, the age distribution is necessarily limited. All except one of the cases are males; however, since only 13 of the 27 females in this building are employed on the floors on which cases developed, and 101 of the 126 males are employed on those floors, it is thought that the unequal sex distribution is not significant.

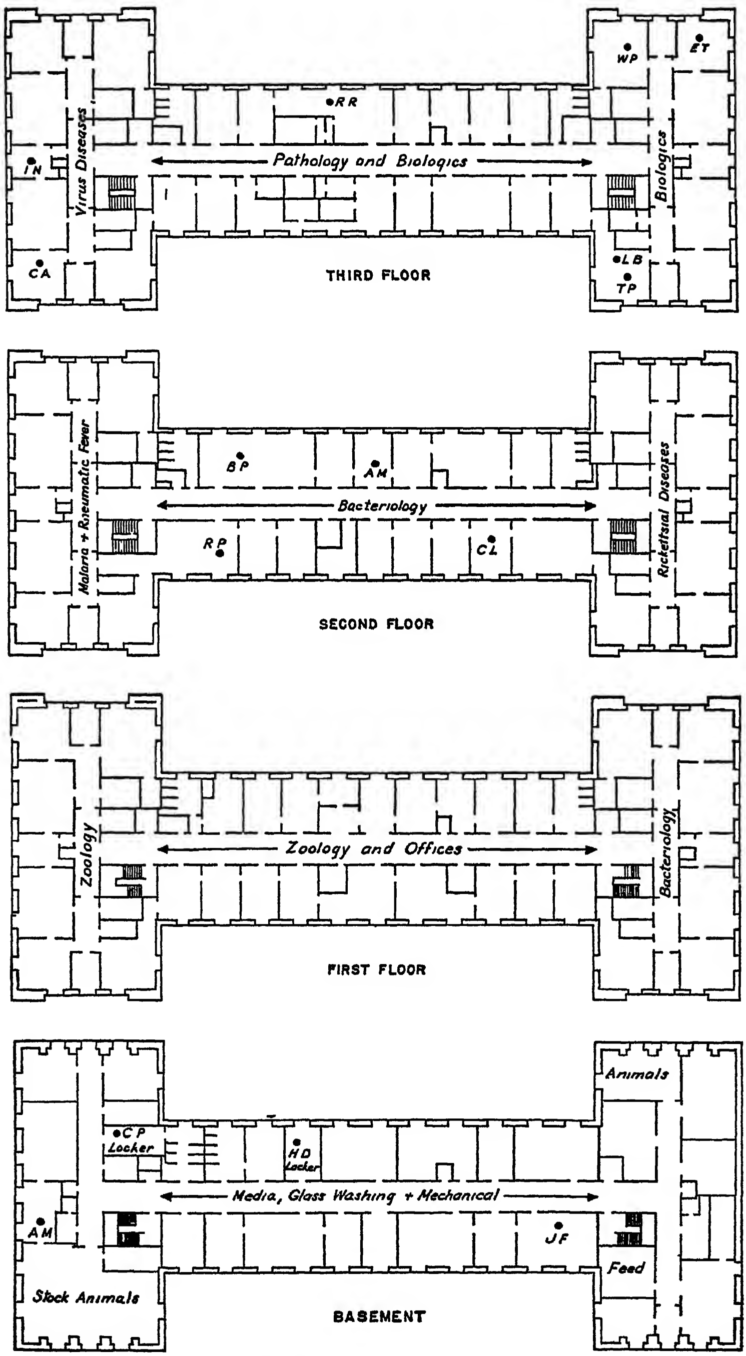


FIGURE 1.—Floor plan of building.

An inquiry revealed no secondary cases in the families of those having had the disease. In all there were 44 such family contacts, including both children and adults. Similarly, no cases occurred in the hospitals where the patients were treated, nor were there recognized cases among the physicians who saw the patients in their homes.

The animals used for experimental work in the South Building are procured from two general sources. Some are purchased from various dealers; these, for the most part, are kept in stock in the North Building. The remainder come from the breeding stock at Bethesda, Md. From these two stock colonies they are delivered to the South Building as needed. Although, as will be noted from table 1, 4 of the cases did not come into intimate contact with laboratory animals, the distribution of animals throughout the building is such that this source of infection cannot be ruled out. It should be mentioned that in the various activities in this building a wide variety of animals is used, including the usual laboratory animals and many wild species, particularly rodents.

The possibility of arthropod transmission was carefully investigated but no suggestive evidence was obtained.

The entire building, with the exception of the two stairwells, is swept between 7 and 8:30 a. m. daily; each floor is mopped with an antiseptic twice weekly. The stairwells are swept and mopped later in the day. The sweeping is done without the use of a dust-settling compound, and it is not unlikely that floor dust may be circulating in the air when the majority of the workers arrive at 8:30 a. m.

The occurrence of 15 cases of pneumonitis among the 153 persons in the South Building during a period of 54 days suggests very strongly that some source of infection existed within that building. Particularly is this true since the 80 persons working in the other two nearby buildings escaped the infection, even though many of them were engaged in similar duties. At the same time, consideration of the duties and habits of those persons who became ill fails to give any clear epidemiological evidence as to the source or type of the infecting agent. The duties of the afflicted individuals varied just as widely as did the duties of those who did not become ill. Animals were handled by 11 of the cases but no single species was used by all. Except for one employee who worked in the basement glass-washing room, all cases could have inhaled floor dust from the second or third floors. The fact that no cases occurred on the first floor but that 4 occurred on the second and 7 on the third floors might be suggestive of air currents and rising dust as a source of infection, especially since the number of persons per floor is about equal.

The epidemiological data which have been presented give very little helpful evidence as to the reservoir of the infecting agent, or the

means by which it spread to persons widely separated and having such varied duties.

CLINICAL DATA

The clinical data to be discussed were collected from the 11 hospitalized cases. The remaining 4 cases treated at home were similar, though not so completely observed.

Onset.—The onset in all the cases was fairly sudden, though usually not severe. Two types of onset predominated, one coryza-like, the other with headache, chilly sensations, and general malaise. There was a latent period of about 3 days following the onset in which the patient continued to work while feeling ill. One case had a dramatic onset, with abdominal cramps, chills, fever, and headache while at work.

Severe and persistent headache was an outstanding symptom developing during the latent period. Other complaints upon admission to the hospital were chills, fever, sweats, and generalized body aches and pains. Three cases had had some nausea and vomiting earlier. Several of the patients developed a short hacking cough, in only a few patients productive, with a small amount of thick, tenacious type of white mucus. In none of the cases was there observed a "prune-juice," "rusty," or blood-tinged sputum.

Approximately half of the patients developed vague chest pains in the substernal region or on the side of their demonstrated lung lesion. The chest pain had more of a neuralgic character than that of pleurisy as it was not associated with respiration. All of the patients complained of insomnia.

Physical findings.—Abnormal findings on physical examination were practically negligible at the time of hospitalization of these patients. This seemed unusual since the illness had been present for several days and the patients were moderately toxic with relatively high fevers on admission. In fact, this absence of physical findings came to be considered one of the characteristics of the disease.

The respirations were quiet and averaged about 23 to the minute. None of the patients appeared to be having any respiratory difficulty. In no case were there any of the obvious indications of pneumonia, i. e., dyspnea, inspiratory dilatation of the alae nasi, inspiratory respiratory grunt, herpes labialis, or cough with rusty or blood-streaked sputum. One case had a mild cyanosis but no evidence of respiratory difficulty.

The pulse was full and of good quality. On admission the average pulse rate was 99 beats and the average temperature was 102.4° F. (100.5° F.–104.5° F.). The pulse rate was low in proportion to the fever and did not always run parallel to the temperature curve. One patient entered with a pulse rate of 88 and a temperature of 103.4° F.

A summary of the clinical findings, including those on the 4 non-hospitalized patients, will be found in table 2, while abstracts of the X-ray reports and physical signs are presented in the Appendix.

The roentgen ray examination of the chest gave the most typical and consistent evidence of pulmonary lesions. A soft, infiltrative lesion, single or multiple, was visible on the films, but was not of the uniform density as seen in lobar pneumonia. These lesions appeared to be more of the patchy type as seen in bronchopneumonia. The right lower lobe was involved in 5 cases; there were only 2 cases that had more than one lobe involved. The roentgenologist reported the films as showing early pneumonia or pneumonitis.

The physical signs of lung involvement were minimal. A slight dullness to the percussion note, a slight increase in breath sounds of a broncho-vesicular character, and an occasional sticky rale over the involved area were the most that usually could be elicited. It is doubtful if many of these cases would have been seriously considered to have had a pneumonic process without roentgen ray examination.

Routine laboratory examination revealed but little of interest. Urinalysis showed a trace to 2 plus albumin in most cases. Two cases had a few hyaline casts. The red cell counts and hemoglobin determinations were within normal limits with the exception of 1 case showing a mild secondary anemia. This patient had been given sulfapyridine before admission. The total white cell count was within normal limits in all except 3 cases, 2 of which had a moderate elevation but in both there was evidence of a concomitant sinusitis; in the third case there was an unexplained reduction in the total white cells. The differential count in all cases showed more than 70 percent neutrophils. Blood cultures were taken on one or more occasions on 9 of the cases and in each was reported as bacteriologically negative. Agglutination tests, using *B. typhosus*, Para A, Para B, *B. abortus*, *B. proteus* OX 19, and *B. tularense* as antigens, were performed on the serum from 7 of the patients and in each instance were reported as negative.

No typical pneumococci were found in the examinations made upon the sputum from 9 of the cases. Mice were injected with sputum from 2 cases and reported negative for pneumococci. Fusiform bacilli, nonhemolytic streptococci, staphylococci, and scattered encapsulated diplococci were the organisms reported.

The usual supportive hospital treatment was followed in all the cases. In addition, sulfapyridine was given the more toxic cases but it is not believed that the drug exerted any marked effect upon the course of the disease. In any event, the fever did not show the prompt and marked recession usually noted after its administration in pneumonia.

TABLE 2.—*Clinical data on 15 patients*

Cases	Race	Date onset, 1940	Date stopped work, 1940	On admission			Total duration fever, days	Date defervescence, 1940	Symptoms at onset	Cough	Expectoration	X-ray
				Temperature, ° F.	Pulse	Respiration						
E. M.	W	Mar. 27	Mar. 27	104.5	110	26	10	Apr. 6	Abdominal pain; malaise	−	−	Pneumonitis.
H. D.	C	Mar. 31	Apr 20	101.0	90	20	11	Apr. 13	Headache	+	+	Early pneumonia.
C. P.	W	Apr. 11	Apr. 14	104.4	110	26	13	Apr. 25	Cold	+	−	Pneumonitis.
L. B.	W	Apr. 12	Apr. 13	103.4	88	28	13	Apr. 25	Headache, chill	+	−	Early pneumonia.
T. P.	W	Apr. 15	Apr. 16	104.2	120	28	12	Apr. 27	Headache	+	−	Do.
A. M.	W	Apr. 17	Apr. 20	102.0	100	20	5+	Died Apr 25	Cold	−	−	Pneumonitis.
B. P.	W	Apr. 18	Apr. 18				7	Apr. 25	Chill, headache	−	−	Do.
C. A.	W	Apr. 19	Apr. 19				8	Apr. 27	Headache, malaise	−	−	Consolidation.
I. N.	W	Apr. 13	Apr. 20	102.5	116	24	9	Apr 29	Cold	+	+	Early pneumonia.
R. R.	W	Apr. 17	do	101.2	100	20	15	May 1	Headache	−	−	Do.
E. T.	W	Apr 25	Apr. 25				8	May 3	Chills, malaise	+	−	Questionable.
R. P.	W	Apr. 22	Apr. 27	100.5	90	20	11	May 8	Headache, malaise	++	+	Pneumonic consolidation
C. L.	W	Apr. 29	Apr. 29				2	May 1	Headache, chills	+	−	Slight pneumonitis.
W. P.	W	May 11	May 13	101.6	88	24	5	May 18	Headache	−	−	Early pneumonia.
J. F.	C	May 17	May 17	102.4	90	22	5+	June 4	Cold	−	−	Pneumonitis.

NOTE.—All males except case R. P.

Other than the one death in the series, there were no serious complications. Three cases developed some meningismus, and in one it was so severe that a diagnostic lumbar puncture was performed and the fluid found to be normal and under normal pressure; the laboratory findings were all within normal limits.

In the one fatal case, an autopsy was performed and a complete histological study was made by Passed Assistant Surgeon T. L. Perrin of the Division of Pathology who will make a detailed report later. In summary of his findings, it may be stated that they are evidently identical with those reported by Kneeland (*7*) and Longcope (*8*).

Appendix

Summary of physical signs and X-ray findings of hospitalized patients:

E. M.—Some shading of the percussion note left lung, most marked at base. Broncho-vesicular breathing. Occasional rales. X-ray: Indistinct shadow. Increased density lower left lung. Pneumonitis.

H. D.—Slight shading to the percussion note at angle right scapula. Broncho-vesicular breathing. Occasional rales. X-ray: Area of increased density below right lung root level. Impression: Pneumonia or pneumonitis.

C. P.—Essentially negative. Few fine rales. Broncho-vesicular breathing over mid-portion left lung posteriorly. X-ray: Pneumonitis left chest from 4th rib to apex.

L. B.—Slight dullness at angle of scapula. Broncho-vesicular breathing and scattered rales. X-ray: Density extending outward and downward from right lung root area. Impression: Pneumonia or pneumonitis.

T. P.—No dullness. Breath sounds normal. Occasional rale at left hilus. X-ray: Area of slightly increased density at right base, extending upward and inward toward lung root. Impression: Pneumonia or pneumonitis.

A. M.—Slight dullness of right base posteriorly. Broncho-vesicular breathing. Few fine rales. X-ray: Pneumonitis, right lower chest; slight pneumonitis left lower chest.

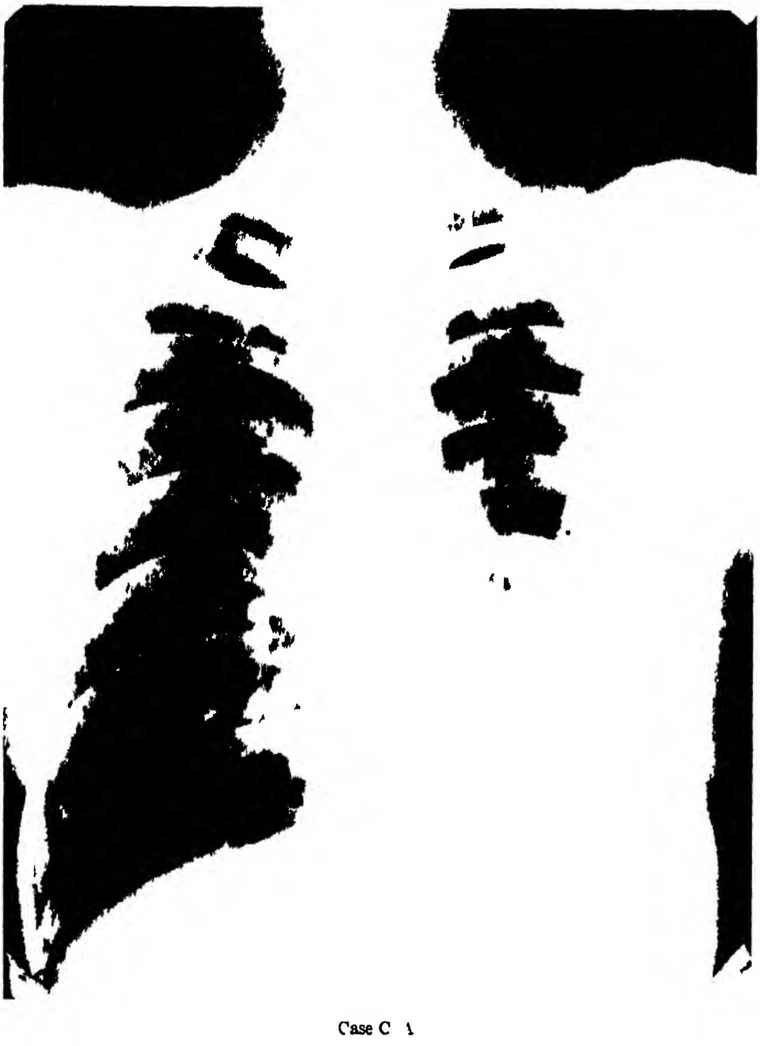
I. N.—No dullness. Broncho-vesicular breathing, right upper lobe. No rales. X-ray: Slight area infiltration at lower outer margin right upper lobe. Impression: Pneumonia.

R. R.—Broncho-vesicular breath sounds and few sticky rales at right base and left scapular angle. X-ray: Suggestive area of infiltration in upper portion lower left lobe. Impression: Pneumonia.

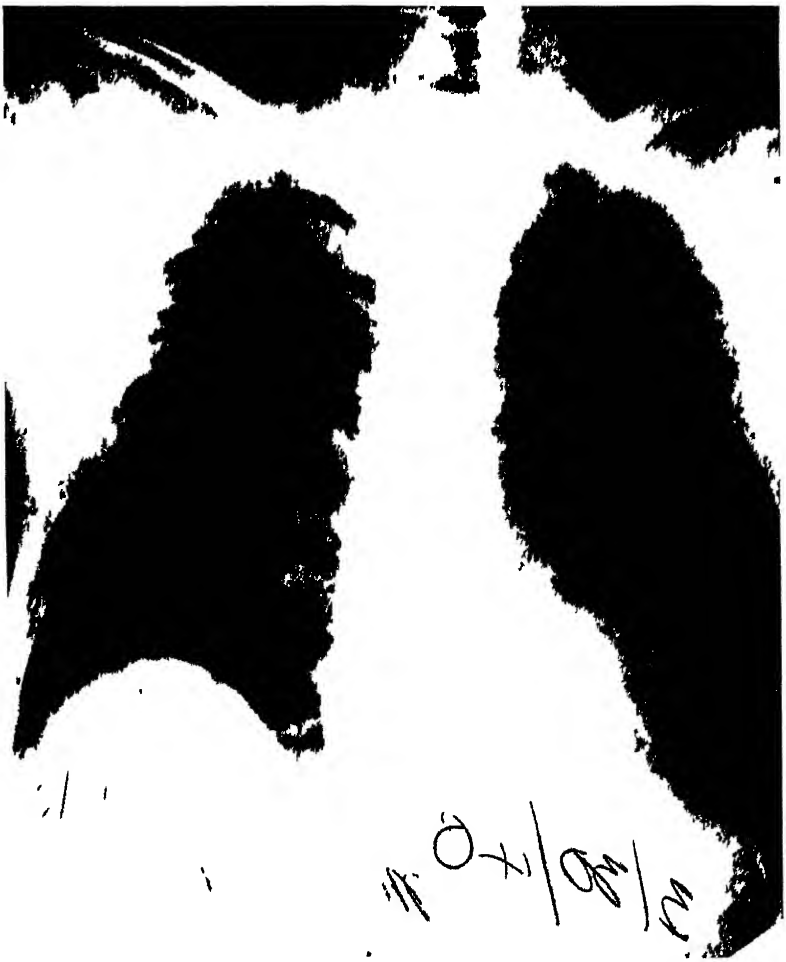
R. P.—No dullness; harsh breath sounds at right base and left hilus areas. Sticky rales in both bases. X-ray: Atypical infiltration involving upper left lung below shadow of clavicle. Early pneumonia.

W. P.—No dullness; breath sounds normal. Occasional rale at left hilus. X-ray: Small area of increased density on level with left lung root, occupying middle and outer portion of lung field. Impression: Pneumonia.

J. F.—Increased fremitus, dullness to flatness on percussion, few bronchial and crepitant rales, increased voice and breath sounds over entire lower lobe on the right side and lower portion of middle lobe anteriorly. X-ray: There is moderate pneumonitis of middle and lower portion of right chest and well-marked dilation of thoracic aorta.



Case C A



Case E M.

[illegible]

Case R R

II. ISOLATION AND IDENTIFICATION OF CAUSATIVE AGENT

By R. E. DYER, *Senior Surgeon*, N. H. TOPPING, *Passed Assistant Surgeon*, and I. A. BENGTSON, *Senior Bacteriologist, United States Public Health Service*

Hornibrook and Nelson have described, in the preceding paper, the epidemiology and the clinical characteristics of an outbreak of pneumonitis which occurred among employees of the National Institute of Health in the spring of 1940. This illness was characterized by a central pneumonia which would have been unrecognized in the absence of X-ray examination of the chest.

The clinical course and the findings in these cases were consistent with each other. The central pneumonia observed in the roentgenogram, coupled with a paucity of physical findings on the examination of the chest, led us immediately to compare these cases with similar reports in the literature. During the past several years there have been many reports of comparable cases. Bowen (*1*) reported cases similar to ours, occurring in troops stationed in Hawaii between the years 1931–34. Allen (*2*) reported 68 cases of "acute pneumonitis" at Fort Sam Houston, Tex., in 1935 among 2,081 cases of respiratory disease. Bock (*3*), in a review of the experience with respiratory disease at Stillman Infirmary at Harvard University from September 1935, to March 1938, had 1,667 cases of which 52 were pneumonia. There were only 4 in the group attributable to a type-specific pneumococcus. The author states, "The great majority of the cases we believe represent a virus pneumonia * * *. As a rule the first evidence of the presence of a pneumonic process was obtained by roentgen-ray examination on the fourth or fifth day after admission." Reimann (*4*) reported 8 cases of "atypical pneumonia" occurring in 1938 from the Jefferson Medical College and Hospital. These cases were apparently more severe than the others referred to and certainly more so than ours. Smiley et al. (*5*) reported 86 cases of "acute interstitial pneumonitis" as being treated in the Cornell University Hospital between October 1937, and January 24, 1939. They describe this disease as follows: "It was apparently a new acute disease of the respiratory tract having as its cardinal feature specific lesions in the lungs inaudible to the stethoscope but definite in the roentgenogram of the chest." They further state, "Though this is apparently a new disease in this area, it is probably identical with the 'acute influenza pneumonitis' described by Bowen, the 'acute pneumonitis' described by Allen and the 'atypical pneumonia' of Reimann." Murray (*6*), in April 1940, reported a further collection of cases at the Stillman Infirmary at Harvard University. During the fall and winter of 1938–39 there were 81 cases of what Murray termed "atypical bronchopneumonia." Even more recently Kneeland and Smentana (*7*) reported 52 cases of "atypical bronchopneumonia" from the Presby-

terian Hospital in New York City during the past two years, while Longcope (*8*) in the same journal reported 32 cases of "bronchopneumonia of unknown etiology (variety X)," observed at the Johns Hopkins Hospital.

It seems from these reports that there is a disease or diseases widespread in geographical distribution which conform clinically to the disease which appeared here in 1940. The etiological agent in our outbreak has been isolated and identified but it is a matter of conjecture whether or not these other cases may have had a similar etiology.

As this epidemic progressed, the clinical and epidemiological behavior of the disease made it appear likely that it was due to a specific infectious agent. Various procedures were, therefore, employed in an effort to isolate and identify this agent. Routine serological studies were negative throughout as were attempts to isolate an organism through the employment of the usual bacteriological procedures. Animal inoculations were carried out by various members of the staff on a variety of species of laboratory animals. To this end whole blood, nose and throat washings were obtained from a number of the patients during the early stages of illness. Material obtained at autopsy of the single fatal case was also used for inoculation.

The principal collaborators in this work were Armstrong, Oliphant, and Haas, who, using mice, ferrets, monkeys, and chicken embryos, directed their efforts toward isolating or ruling out the viruses of lymphocytic choriomeningitis, influenza, and psittacosis, while having the hope of picking up any other virus to which these animals were susceptible.

It is the purpose of this communication to describe the isolation of a rickettsia from three of these epidemic cases and to give the details of the evidence which demonstrates its identity with the rickettsia previously isolated from cases of "Q" fever (*9–16*).

ISOLATION OF STRAINS

From attempts on 4 separate cases, 3 isolations were made.

1. *"A" strain.*—Blood was drawn from C. A on the day of onset, April 19, 1940, and about 4 cc. of whole blood were inoculated intraperitoneally into each of 2 guinea pigs. After an 11-day incubation period both of these guinea pigs had an elevation of temperature. After 2 or 3 days of fever heart blood from each animal was passed to 4 more guinea pigs, thus establishing two lines of the infectious agent. One of these lines was dropped after passage through 4 generations of guinea pigs. The other line of this strain was studied through 17 serial passages before it was discontinued.

2. *"P" strain.*—Blood was drawn from C. P. on April 19, 1940, the eighth day of fever, and about 3.5 cc. of whole blood were immediately inoculated intraperitoneally into each of 2 guinea pigs. After 3 and 9 days, respectively, each of these guinea pigs had an elevation of temperature. From the animal with the 9-day incubation period a strain was started and passed through 3 generations of

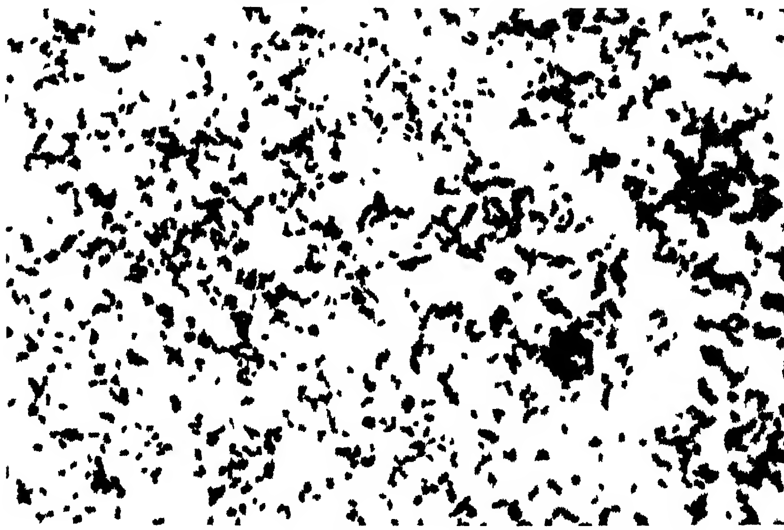


FIGURE 1 —Rickettsiae of the X strain of "Q" fever Machiavello stain × 2 000

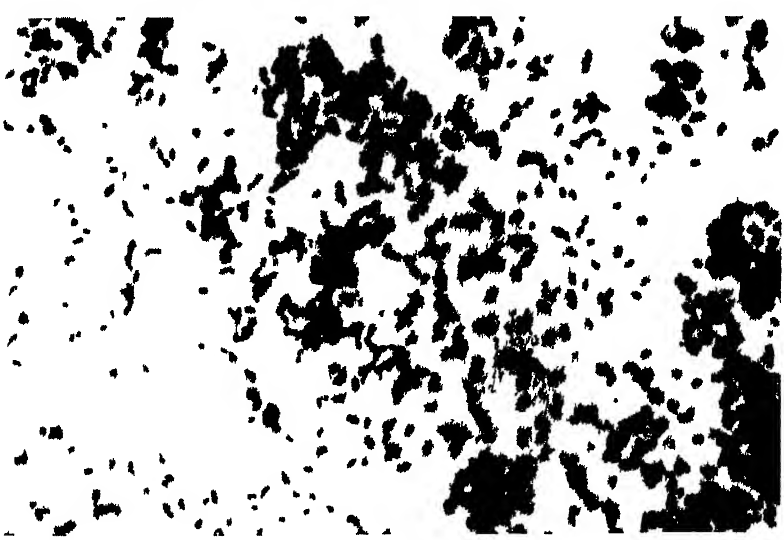


FIGURE 2 —Rickettsiae of the X strain from recovered case C A Machiavello stain, × 2,000

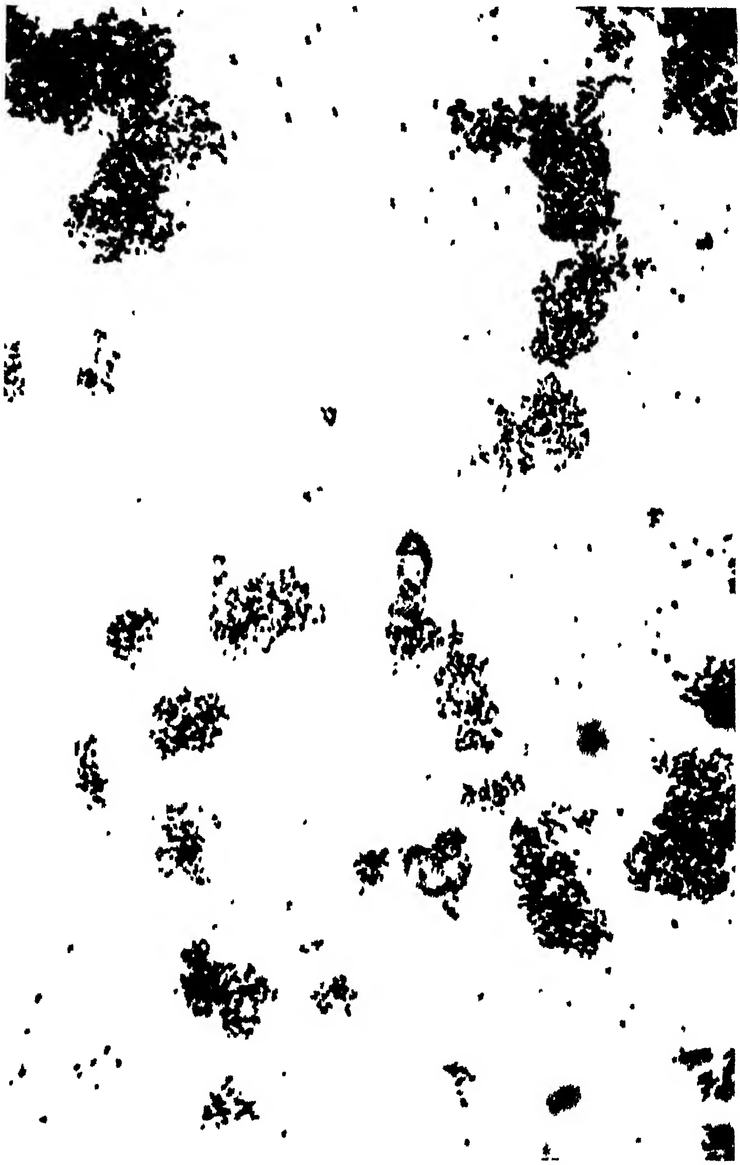


FIGURE 3.—Agglutinated rickettsiae. Immune guinea pig serum + X strain rickettsiae. Machiavello stain, × 1,500.

guinea pigs after which it was discontinued. The other line of this strain was studied through 16 passages before it was discontinued.

3. *"M" strain.*—At the autopsy of A. M. on April 26, 1940, a small piece of spleen was removed, macerated in sterile saline, and 3 cc. of the suspension was inoculated into each of 2 guinea pigs. After a 7-day incubation period both guinea pigs had an elevation of temperature. From each of them a line of the third strain of the infectious agent was started. One line was passed through 3 generations of guinea pigs and then dropped. The other line of this strain has been passed through more than 20 serial passages in guinea pigs and this strain is being carried routinely in this laboratory as the type strain.

During the first transfer of the "P" strain it was noticed that the gross pathology closely resembled that described (*11*, *14*) and observed here in guinea pigs for American "Q" fever. As the other strains were isolated the same gross pathological changes in the guinea pigs were noted.

DEMONSTRATION OF RICKETTSIAE

Mice were inoculated intraperitoneally with 0.5 cc. each of defibrinated blood from an infected guinea pig of the first passage of the "A" strain. The spleens of these mice all contained a few typical "Q" fever rickettsiae, recorded as +. A second passage in mice yielded rickettsiae recorded as ++ and +++ in the spleens, and + and ++ in the livers of all 6 mice inoculated. Titrations of the mouse spleen in guinea pigs showed infection resulting from the 1×10^{-8} and possibly 1×10^{-9} dilutions. The animal receiving the 1×10^{-2} dilution was used for pathological examination; those inoculated with dilutions 1×10^{-3} to 1×10^{-8} ran temperatures typical of "Q" fever. Of these, the ones inoculated with dilutions 1×10^{-3} and 1×10^{-8} succumbed before being tested for immunity. Those inoculated with dilutions 1×10^{-4} to 1×10^{-7} were immune to the "Q" virus. Results with the animal inoculated with the 1×10^{-9} dilution were equivocal as a slight elevation of temperature occurred both at the time of the original inoculation and also when the immunity test was made. Similar results were secured with the "M" strain.

CROSS-IMMUNITY TESTS

Cross-immunity tests were performed in order to determine the identity of the three strains isolated from the cases of pneumonitis.

Figure 4 illustrates the fact that these three strains give cross-immunity to each other and figure 5 that they give cross-immunity to both a strain of American "Q" fever previously reported from this laboratory under the designation of "Strain X" (*14*) and to a strain of Australian "Q" fever received from Burnet (*17*).

PROTECTION TESTS WITH IMMUNE ANIMAL SERA

Hyperimmune sera were produced in guinea pigs and rabbits by repeated injections of phenolized rickettsiae of the "X" strain of "Q" fever, followed by the injection of living rickettsiae from heavily infected mouse or guinea pig spleen. Agglutinating titers of 1: 5,120 and 1: 10,240 were reached in some of the individual guinea pigs.

Amounts of hyperimmune sera varying from 0.01 to 0.5 cc. were mixed with 0.5 cc. amounts of sera from guinea pigs infected with the "M" strain and with the "X" strain of "Q" fever, taken on the second or third day of fever. The results obtained in four groups of protection tests against the two strains were

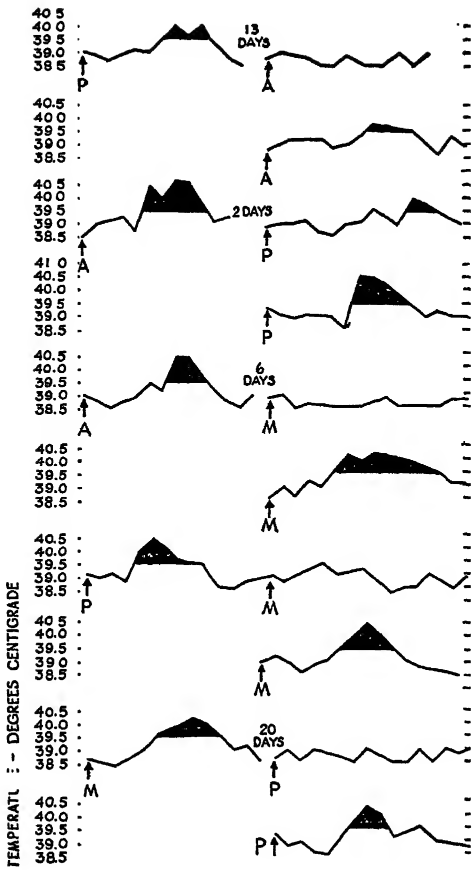


FIGURE 4.—Results of cross-immunity tests in guinea pigs between the three strains, A, P, and M. Arrows indicate inoculation with designated strain.

similar. In one test there was complete protection with all dilutions of the immune serum against both strains. The other three tests were less satisfactory but parallel results were obtained in all cases against the two viruses. The results of the first test are tabulated in the accompanying table.

TABLE 1.—*Protection test in guinea pigs with hyperimmune "Q" serum ("X" strain) against "M" strain virus*

Guinea pig number	Immune serum	Virus	Result	Guinea pig number	Immune serum	Virus	Result
	cc.	cc.			cc.	cc.	
838	0.01	0.5	Protection, no fever.	847	0.2	0.5	Protection, no fever.
839	.01	.5	Do.	848	.5	.5	Do.
840	.02	.5	Do.	849	.5	.5	Do.
841	.02	.5	Do.	850	0	.5	6 days of fever.
842	.05	.5	Do.	851	0	.5	2 days of fever.
843	.05	.5	1 day of fever.	852	0	.5	6 days of fever.
844	.1	.5	Protection, no fever.	853	0	.5	8 days of fever.
845	.1	.5	Do.				
846	.2	.5	Do.				

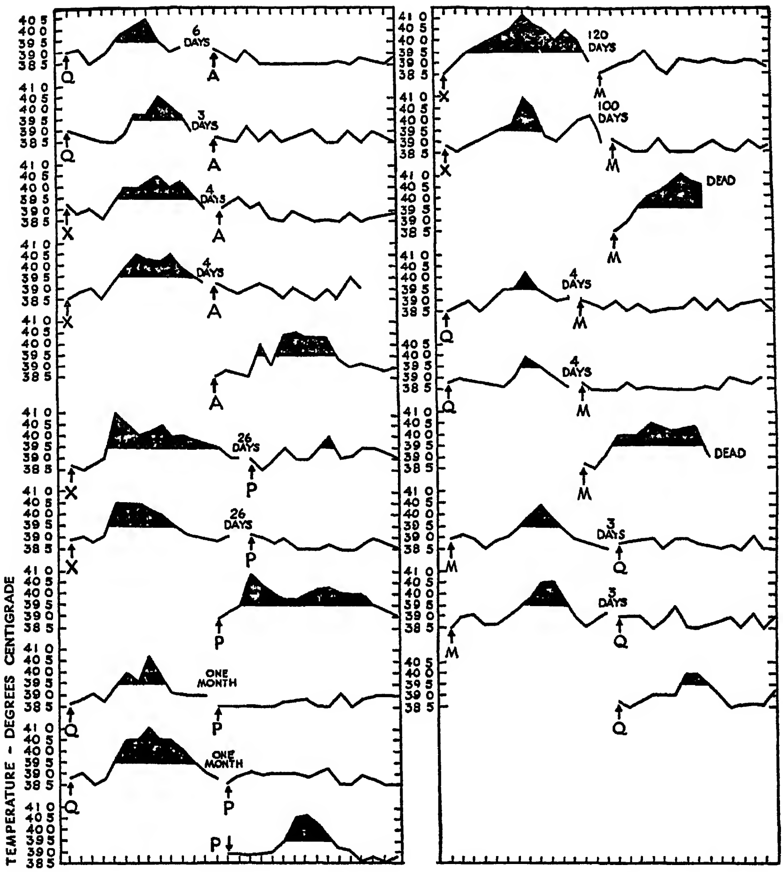


FIGURE 5.—Results of cross-immunity tests in guinea pigs between known "Q" fever strains (Q and X) and the A, P, and M strains.

VACCINE TESTS

Vaccines were prepared from the "X" strain of "Q" fever as follows.

Passage in mice was continued by the intraperitoneal inoculation of infected yolk sac or mouse spleen until rickettsiae were very numerous in the mouse spleens (+++). This was also done in guinea pigs. The heavily infected spleens were macerated and 10 percent suspensions in buffered salt solution (pH 7.0) prepared. The larger particles were precipitated by centrifugation at 1,000 r. p. m. for 5 minutes, followed by centrifugation of the supernatant fluid at 4,500 r. p. m. for 1 hour. The precipitated rickettsiae were resuspended in one-fourth the original volume of salt solution and then acidified to pH 5.0 with dilute glacial acetic acid. This precipitated further protein material. Phenol was added to a concentration of 0.4 percent and formalin to 0.1 percent. None of the guinea pigs inoculated with the vaccines developed febrile reactions, showing that the material was not infectious.

Guinea pigs received two inoculations of 1 cc. each of a 5-percent suspension of the vaccine, the interval between the two inoculations being 1 week.

Approximately 2 weeks after the last inoculation of vaccine, the vaccinated animals were inoculated with either guinea pig blood, virus, or infected yolk sac suspension. Parallel tests were carried out against both the "M" strain and the "X" strain of "Q" fever. Similar results were obtained with both strains. The results of one test are summarized in the accompanying table.

TABLE 2.—*Identification of "M" strain with the "X" strain of "Q" fever by vaccine tests*

Vaccine X 25144 (spleen). Immunity tested with yolk sac or guinea pig virus

Guinea pig number	Inoculations of vaccine	Virus	Result	Guinea pig number	Inoculations of vaccine	Virus	Result
		Yolk sac				*Yolk sac*	
786	2	1×10^{-2} "X" strain	No fever.	945	0	1×10^{-4} "M" strain	4 days fever.
787	2	do	Do.	946	0	1×10^{-3} "M" strain	Do.
788	2	1×10^{-2} "M" strain	1 day fever.	947	0	1×10^{-2} "M" strain	5 days fever.
759	2	do	No fever.				
932	0	1×10^{-9} "X" strain	6 days fever.			*Guinea pig virus*	
933	0	1×10^{-8} "X" strain	8 days fever.	790	2	1 cc. "X" strain	No fever.
934	0	1×10^{-7} "X" strain	1 day fever.	791	2	do	Do.
935	0	1×10^{-6} "X" strain	5 days fever.	792	2	1 cc. "M" strain	Do.
936	0	1×10^{-5} "X" strain	Died.	793	2	do	Do.
937	0	1×10^{-4} "X" strain	6 days fever.	1002	0	1 cc. "X" strain	4 days fever.
938	0	1×10^{-3} "X" strain	8 days fever.	1003	0	do	3 days fever.
939	0	1×10^{-2} "X" strain	4 days fever.	1004	0	do	5 days fever.
940	0	1×10^{-9} "M" strain	5 days fever.	1005	0	do	6 days fever.
941	0	1×10^{-8} "M" strain	4 days fever.	1006	0	1 cc. "M" strain	5 days fever.
942	0	1×10^{-7} "M" strain	3 days fever.	1007	0	do	4 days fever.
943	0	1×10^{-6} "M" strain	Do.	1008	0	do	7 days fever.
944	0	1×10^{-5} "M" strain	1 day fever.	1009	0	do	Do.

Since rickettsiae have been demostrated to be the etiological agent of "Q" fever, cross-immunity tests were performed with the "A," "P," and "M" strains against known strains of other rickettsial diseases. There was no cross-immunity demonstrated with either Rocky Mountain spotted fever or with endemic or epidemic typhus.

Armstrong, of this laboratory, in unpublished work, has similarly shown that there is no cross-immunity between the "M" strain and a strain of lymphocytic choriomeningitis. Oliphant has likewise demonstrated that there was no cross-immunity between Australian "Q" and psittacosis virus.

FILTRATION EXPERIMENTS

It has been reported that the rickettsiae of both the Australian and American varieties of "Q" fever can be passed through filters capable of holding back ordinary bacteria (*10, 11*). An experiment was designed to test the filterability of our "M" strain, and, at the same time, to compare it in this respect with a strain of Rocky Mountain spotted fever.

The spleen was removed from a guinea pig infected with Rocky Mountain spotted fever, macerated and suspended in saline. Two guinea pigs were each inoculated with 2 cc. of this suspension. The remainder was filtered through a Berkefeld "N" filter and 2 cc. of the filtrate were inoculated into each of two guinea pigs.

The filter was then washed by passing through it a large quantity of sterile saline. The same procedure was then followed only using a spleen suspension prepared from our "M" strain. Two guinea pigs were inoculated with the unfiltered suspension and two were inoculated with the filtrate. Again the filter was washed. An agar culture of *Staphylococcus aureus* was suspended in saline, broth was inoculated by adding 0 5 cc of this suspension and then the remainder was passed through the filter. A second tube of broth was then inoculated with 0.5 cc. of the filtrate.

The results of these various filtrations were as follows: 1. The two guinea pigs inoculated with unfiltered virus of Rocky Mountain spotted fever each developed typical Rocky Mountain spotted fever; 2. The two guinea pigs inoculated with the filtrate of Rocky Mountain spotted fever failed to develop the infection; 3. The two guinea pigs inoculated with the unfiltered "M" virus developed the typical disease; 4. The two guinea pigs inoculated with the filtered "M" virus developed the typical disease; 5. There was a profuse growth of staphylococcus in the broth inoculated with the unfiltered suspension; and, 6. The broth inoculated with the filtrate of the staphylococcus suspension remained sterile.

From this experiment it is obvious that the "M" virus successfully passed through a Berkefeld "N" filter which completely held back *Staphylococcus aureus* as well as the rickettsiae of Rocky Mountain spotted fever.

PROTECTION TESTS AND AGGLUTINATION TESTS. RESULTS WITH SERA FROM CONVALESCENT CASES AND OTHER INDIVIDUALS

As in the isolation of any infectious agent from animals which were inoculated with material from human cases, the question arises as to whether or not the agent originated from the human case or was simply an accidentally encountered infection of the animal. The instances here reported, in which 6 guinea pigs inoculated with material from 3 similar human cases each developed the same disease, offer strong evidence that the guinea pig disease originated from the three cases of pneumonitis.

Further evidence that the infectious agent originated from these human cases was acquired by two separate techniques. Shortly after the appearance of the last case of pneumonitis, sera were collected from most of the staff of the affected building. Part of these sera were used in agglutination tests in which the rickettsiae from the "X" strain of "Q" fever and our "A" strain were used as antigens.

Suspensions of the rickettsiae of the "X" strain of "Q" fever and our "A" strain were prepared from heavily infected mouse spleens, the technique being that used in the preparation of the vaccines with the exception that merthiolate 1:10,000 was used as preservative instead of phenol and formalin. The suspensions were standardized to correspond to 300 parts per million of silica.

Small tubes were used for the tests and 0.1 cc. amounts of serum dilutions and antigens were employed. Incubation was at 45° C. for 5 hours. Readings were made immediately after removing from the water bath and on the following morning after standing at 4° C. overnight.

The macroscopic readings of the agglutination test recorded in table 3 ranged from a maximum of 2 to a minimum of 0.

The serums were obtained from all individuals between May 22 and June 1, 1940. These sera have been divided into three groups: (I) Proved and suspicious cases; (II) other individuals employed in the section of the building given over to the study of rickettsial diseases; and (III) individuals employed in other parts of the building.

TABLE 3.—*Results of agglutination test using sera from proved and suspicious cases and normal controls against the rickettsiae of the "X" strain of "Q" fever and our "A" strain*

Number of serum	"X" strain antigen					"A" strain antigen				
	1/10	1/20	1/40	1/80	1/160	1/10	1/20	1/40	1/80	1/160
Group I (proved cases):										
E. M.	1	2	2	2	1	2	2	2	1	1−
H. D.	2	2	2	2	2	2	2	2	2	1
C. P.	2	2	2	2	1	1	1	1	1−	0
L. B.	1	1	1	1−	0	2	2	2	1	1−
T. P.	1	2	2	2	1	1	1	1	1−	0
B. P.	0	0	0	0	0	0	0	0	0	0
C. A.	1	1−	1−	0	0	1	1	1−	0	0
I. N.	2	2	2	1	0	1	1	1	1−	0
R. R.	0	0	0	0	0	1	1−	0	0	0
E. T.	2	2	2	1	0	1	1	1−	0	0
W. P.	2	2	2	1	0	1	1	1−	1−	0
C. L.	0	0	0	0	0	0	0	0	0	0
A. M. (died).										
R. P. (not done).										
J. F. (not done).										
Suspicious cases:										
J. O.	0	0	0	0	0	0	0	0	0	0
C. B.	2	2	2	2	1	1	1	1	1−	0
Group II (controls in rickettsial unit):										
No. 2	1	1	1−	0	0	1	1	1−	0	0
No. 4	1−	0	0	0	0	1−	0	0	0	0
No. 5	1−	1−	0	0	0	0	0	0	0	0
No. 6	0	0	0	0	0	1−	0	0	0	0
No. 7	1	1−	0	0	0	1−	0	0	0	0
No. 12	1−	0	0	0	0	1−	0	0	0	0
No. 14	1−	1−	0	0	0	0	0	0	0	0
No. 19	0	0	0	0	0	1−	1−	0	0	0
No. 20	0	0	0	0	0	1−	1−	1−	0	0
No. 21	0	0	0	0	0	0	0	0	0	0
Group III (controls not in rickettsial unit):										
No. 8	0	0	0	0	0	0	0	0	0	0
No. 9	0	0	0	0	0	0	0	0	0	0
No. 10	0	0	0	0	0	0	0	0	0	0
No. 11	0	0	0	0	0	0	0	0	0	0
No. 13	1−	1−	1−	1−	0	0	0	0	0	0
No. 17	0	0	0	0	0	0	0	0	0	0
No. 18	0	0	0	0	0	0	0	0	0	0
No. 22	1	1	1	1−	0	1	2	2	1−	0
No. 23	0	0	0	0	0	0	0	0	0	0
No. 24	0	0	0	0	0	0	0	0	0	0
No. 25	0	0	0	0	0	0	0	0	0	0
No. 27	0	0	0	0	0	1−	0	0	0	0
No. 28	0	0	0	0	0	1−	0	0	0	0
No. 34	0	0	0	0	0	0	0	0	0	0
No. 35	0	0	0	0	0	0	0	0	0	0
No. 36	0	0	0	0	0	0	0	0	0	0
No. 37	0	0	0	0	0	0	0	0	0	0
No. 38	0	0	0	0	0	0	0	0	0	0
No. 41	0	0	0	0	0	0	0	0	0	0
No. 42	0	0	0	0	0	0	0	0	0	0
Immune sera										
Guinea pig	------	------	------	------	------	4	4	4	4	3
Rabbit	4	4	4	3	3	------	------	------	------	------

Table 3 offers evidence that the majority of these cases developed agglutinins for "Q" fever rickettsiae. There is no explanation for the failure of cases B. P., R. R., and C. L. to develop agglutinins.

That the developed agglutinins were specific for the "Q" rickettsiae was demonstrated by using these same sera in a test identical except for the antigen which was the rickettsiae of typhus fever. There was no agglutination in the test although the control serum from a recovered typhus fever case agglutinated these rickettsiae well.

The control sera collected from presumably unaffected people throughout the building failed to show any consistent agglutination of the "Q" rickettsiae with the possible exception of the sera from those working in the rickettsial unit. One of these, No. 7, had an illness in 1938 and was the original source of the "X" strain of "Q" fever (*14*). Unrecognized illnesses or inapparent infections may or may not explain the presence of the low titer agglutinins in Nos. 2, 4, 5, 12, and 14 in the rickettsial unit, and similarly in the controls not in this unit, Nos. 13 and 22.

The second method employed to acquire knowledge as to the exact origin of the three strains isolated was the demonstration of protective antibodies in the sera of convalescents. The technique of these tests was that usually described for virus neutralization tests, and though this work is incomplete, several convalescent sera tested have been shown to have demonstrable virus-neutralizing bodies for the "M" strain.

SUMMARY AND CONCLUSION

1. An epidemic of pneumonitis comprising 15 proved cases occurred in one building of the National Institute of Health in Washington, D. C., in the spring of 1940.

2. Four attempts were made to isolate a causative agent from proved cases of pneumonitis. The identical agent was isolated from 3 of these cases and later identified as the rickettsia of "Q" fever.

3. No valid evidence was adduced that personal contact or the intervention of an arthropod vector was responsible for the transmission of the disease.

4. Strains of "Q" fever have been carried in animals and tissue cultures in one unit of the Institute since 1938. Whether or not this unit served as a source of infection is open to question, since the personnel of this unit were spared and the cases were widely distributed throughout the building.

5. A comparison of the clinical features and physical findings in these cases with various series reported from other sections of the United States in the past few years reveals suggestive similarities

REFERENCES

(1) Bowen, Albert: Acute influenza pneumonitis. Am. J. Roentgenol., **34:** 168 (1935).
(2) Allen, William H.: Acute pneumonitis. Ann. Int. Med., **10:** 441 (1936–37).
(3) Bock, Arlie V.: Clinical observations, complications, and treatment of acute respiratory tract infections. Ann. Int. Med., **12:** 317 (1938).
(4) Reimann, Hobart A.: An acute infection of the respiratory tract with atypical pneumonia. J. Am. Med. Assoc., **111:** 2377 (1938).
(5) Smiley, D. F., Showacre, E. C., Lee, W. F., and Ferris, H. W.: Acute interstitial pneumonitis. J. Am. Med. Assoc., **112:** 1901 (1939).
(6) Murray, M. E.: Atypical bronchopneumonia of unknown etiology. New Eng. J. Med., **222:** 565 (1940).
(7) Kneeland, Y., and Smentana, H. F.: Current bronchopneumonia of unusual character and undetermined etiology. Bull. Johns Hopkins Hosp., **67:** 229 (1940).
(8) Longcope, W. T.: Bronchopneumonia of unknown etiology (Variety X). A report of thirty-two cases with two deaths. Bull. Johns Hopkins Hosp., **67:** 268 (1940).
(9) Derrick, E. H.: "Q" fever, a new fever entity: Clinical features, diagnosis, and laboratory investigations. Med. J. of Australia, **2:** 281 (1937).
(10) Burnet, F. M., and Freeman, M.: Experimental studies on the virus of "Q" fever. Med. J. of Australia, **2:** 299 (1937).
(11) Davis, G. E., and Cox, H. R.: A filter-passing infectious agent isolated from ticks. Isolation from *D. andersoni*, reactions in animals and filtration experiments. Pub. Health Rep., **53:** 2259 (1938).
(12) Cox, H. R.: A filter-passing infectious agent isolated from ticks. Description of organism and cultivation experiments. Pub. Health Rep., **53:** 2270 (1938).
(13) Parker, R. R., and Davis, G. E.: A filter-passing infectious agent isolated from ticks. Transmission by *D. andersoni*. Pub. Health Rep., **53:** 2267 (1938).
(14) Dyer, R. E.: A filter-passing infectious agent isolated from ticks. Human infection. Pub. Health Rep., **53:** 2277 (1938).
(15) Burnet, F. M., and Freeman, M.: A comparative study of rickettsial strains from an infection of ticks in Montana (United States of America) and from "Q" fever. Med. J. Australia, **2:** 887 (1939).
(16) Bengtson, Ida A.: In press.
(17) Dyer, R. E.: Similarity of Australian "Q" fever and a disease caused by an infectious agent isolated from ticks in Montana. Pub. Health Rep., **54:** 1229 (1939).

THE RELATION OF BODY BUILD TO DRUG ADDICTION [1]

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The frequency with which drug addicts have been characterized as abnormal with respect to temperament justifies a search into the possibility of finding constitutional factors associated with addiction. From the time that Hippocrates presented his phthisic and apoplectic constitutions, a number of writers have emphasized the significance of the biological structure in relation to behavioral and pathological predispositions. Today there are several so-called schools of clinical anthropology. The German school is best known through the work of Bauer, Kretschmer, and Wertheimer; the Italian school through Viola, Pende, and Naccarati; the French school through Sigaud and his pupils; and the English and American work is typified by Draper,

[1] The term "drug addiction" as used in this paper refers to the habitual use of opium or one of its derivatives.

Berman, and MacAuliffe. Although all of these schools are united in the hypothesis of an association between physical proportion and mental predisposition, the great diversity of morphologic classifications and terminology has led to considerable confusion. Freeman (*10*) states, "The age old tendency to classify and codify was responsible for the division of all individuals into two or more types, the number of classifications now rapidly approaching legion: the herbivorous and the carnivorous; the mensontomorph and the hyperontomorph; the linear and the lateral; the cerebral, respiratory, digestive, and muscular; the asthenic, athletic, and the pyknic—to mention but a few." The fact of outstanding significance, however, is not the diversity of classification, which is really a matter of terminology, but rather the fact that so many authors, many unknown to each other, have observed similar relationships between certain types of body build and certain mental or physical predispositions. It matters little whether we call a tall, thin person an asthenic, a linear type, a microsplanchnic, or a hyperontomorph, but it is significant that the various authors have in general agreed as to the physical and mental characteristics of these types.

Those workers who have attempted to check on the claims of the various constitutional schools have generally neglected to consider in detail the ramifications and complexities of body-type differentiation. For example, although the height-weight ratio may serve as a rough index of Kretschmer's types, it does not separate the dysplastic from the other groups, and furthermore this ratio is a function of age and race. Pende (*27*) has consistently emphasized the frequency of independent variation of the cardiovascular, the lymphopoietic, and other subordinate systems, and has called attention to the psychological differences accompanying these variations.

Narcotic drug addiction has been described as a symptom of social failure. If this postulate is correct, it would seem reasonable to expect to find predominance of mental and physical inferiority or abnormality in the addict group. The large-scale studies of Hooton (*15*) on criminal populations were initiated from this point of view, and in a very excellent study of body build in its relation to personality, P. S. DeQ. Cabot (*4*) finds support for a theory of socio-biological advantage which postulates a correspondence between socio-sthenic traits and biologically "good" physique.

In the present study an attempt has been made to obtain sufficient measures for reliable classification of body types. In addition to a variety of body measurements, a number of "subjective" estimations were made concerning contours, profiles, and general indications of disproportionate development. Wherever possible, these subjective estimates were made with the help of charts so as to increase reliability of observation.

According to McDougall's metabolic theory of temperament (*21*), one would expect a preponderance of introverts in any group addicted to alkaloid drugs, and this prediction is partly substantiated in the Mayor's Committee Report (*28*) on 318 morphine addicts, in which 132 of the cases were classified as schizoid as compared with 97 syntoids and 89 mixed. On the other hand, Wilson's study (*37*) of 216 incarcerated addicts does not agree with the results reported by the Mayor's Committee. On the Neymann-Kohlstedt Diagnostic Test for Introversion-Extroversion, Wilson's group falls in the ambivert class, with a slight tendency toward introversion. On the Bernreuter Personality Schedule, however, the group showed distinct tendency toward extroversion.

On the basis of subjective judgments, the Mayor's Committee found that 167 of the 318 morphine addicts would be classified as asthenics, with 84 pyknics and 67 athletics (Kretschmer's body-type classification). These results are difficult to reconcile with the findings of Light, Torrance, et al. (*20*), who, on the basis of actual measurements, found that a group of 100 addicts were slightly heavier for their ages and heights than the normal standard as given by the Mutual Life Insurance Co. of New York.

Relatively few measures on the narcotic drug addict are available in a form admitting of comparison with other groups. Light, Torrance, et al. have stated, "We have been unable to find in the literature any data on actual weights, heights, vital capacities and tests of physical fitness in opium addicts. The various statements made in reference to opium addiction and its effects on physical appearance and physical fitness apparently are based on limited inspection." For this reason, the data of this study are presented in complete form.

Procedure.—Four hundred native-born, white, adult males with verified records of addiction were studied anthropometrically following admission to the United States Penitentiary Annex, Fort Leavenworth, Kans. These cases represented routine admissions, the only selecting factors being those of color, nativity, and verified history of drug usage. Measurements were taken on unclothed patients according to the technique in Hrdlicka's Anthropometry (*16*). Subjective estimates of certain body features were made prior to measurement, using pantograph enlargements of Wertheimer-Hesketh charts (*35*). The following estimates were made:

1. *Face shape:* Five cornered, shield shaped, long egg, and short egg. (Wertheimer-Hesketh chart.)
2. *Face profile:* Forehead (Wertheimer-Hesketh chart). Nose: Large, small, or medium. Cheekbone: Hyperplastic or hypoplastic. Jaw: Receding, protruding, massive, or deviating. .Mouth: Overbite, straight, or underbite.
3. *Conformation of head:* (Wertheimer-Hesketh chart.)
4. *Baldness:* Described.
5. *Neck:* Long, medium, or short; thick or thin.

6. *Trunk profile:* (Wertheimer-Hesketh chart.)
7. *General appearance as to nutrition:* Described.
8. *Skin color:* Described.
9. *Musculature:* Firm, soft, with notation as to location of greatest development.
10. *Dysplastic traits:* Special attention given to size and shape of hands, disproportion between trunk and limb length, unusual distribution of fat, unusual arrangement or amount of body hair, and distribution of pubic hair.
11. *Estimate of body type:* (Kretschmer.)

The following anthropometric measurements were made:

1. Height.
2. Weight.
3. Leg length: (Lower border of the internal malleolus to crest of anterior-superior iliac spine.)
4. Transverse chest diameter.
5. Sagittal chest diameter.
6. Trunk height. (Symphysis pubis to supra-sternal notch.)
7. Head circumference.
8. Neck circumference.
9. Forearm circumference.
10. Calf circumference.
11. Umbilicus to symphysis pubis.
12. Umbilicus to supra-sternal notch.

The following indexes were calculated:

1. Wertheimer index (*35*): $\frac{\text{Leg length} \times 1{,}000}{\text{Trunk height} \times \text{chest width} \times \text{chest depth.}}$
2. Pignet index (*6*): Stature in cm. — (chest circumference plus weight in kg.)
3. Height/weight ratio (*26*): $\frac{\text{Height in cm.}}{\text{Weight in kg.}} \times 100.$

The sagittal and transverse chest measures were obtained by means of a Martin (*22*) anthropometer, the recorded reading being midpoint between the readings on normal inspiration and expiration.

One hundred and twenty-seven cases were remeasured 5½ months after their initial examination for the purpose of determining reliability of measurement and the directions of change following incarceration. These cases represented an unselected sampling of the original 400, recall being based upon the numerical order of initial examination.

In the light of general influence of age upon physical development, the data are analyzed and presented in the various age groupings shown in table 1. The largest number of cases falls into the 30–40 age decade, the mean age of the total group being 36.7 years. A comparison of the 20–39 with the 40–59 age group is shown in table 2. There is no significant difference between the older and younger groups with reference to stature and weight, but the bodily proportions show certain significant differences. The older group shows a greater development of the trunk as compared with the extremities. It was found (table 2) that both groups reported their usual weight to be higher than their actual admission weight, with the older group

showing the greater discrepancy. The reported weight corresponded with the actual weight after 5½ months of incarceration.

TABLE 1.—*Body measurements of 400 white male drug addicts from various States incarcerated at Fort Leavenworth, Kans.*

Measure	Symbol	Ages 20–29 N-89		Ages 30–39 N-172		Ages 40–49 N-111		Ages 50–59 N-22		Ages 20–39 N-261		Ages 40–59[1] N-133	
		Mean	S. D.[2]	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Stature in cm	S	171.46	6.66	172.19	5.71	171.89	6.76	172.64	6.74	171.94	5.99	172.01	6.81
Weight in kg	W	63.98	7.05	64.79	6.92	65.24	10.35	66.04	9.92	64.51	6.97	65.38	10.28
Usual weight	UW	67.78	7.43	69.11	8.18	70.44	11.03	72.62	10.26	68.65	8.06	70.80	11.21
Greatest weight	GW	73.07	8.72	74.65	9.33	76.88	12.77	80.63	11.99	74.11	9.18	77.50	12.60
Leg length	LL	86.55	4.47	86.33	4.18	85.81	4.59	88.09	4.67	86.40	4.30	86.19	4.73
Trunk height	TH	57.27	2.53	57.69	2.44	57.72	2.83	57.94	3.12	57.55	2.56	57.76	2.93
Transverse chest	TCH	27.88	1.59	27.89	1.53	27.87	2.07	27.61	1.81	27.89	1.60	27.83	2.03
Sagittal chest	Sg Ch	20.01	1.36	20.41	1.51	21.16	2.00	21.62	2.05	20.27	1.48	21.24	2.01
Head circumference	Hd C	56.47	1.42	56.92	1.44	56.76	1.56	57.20	1.40	56.77	1.45	56.83	1.53
Neck circumference	NC	35.27	1.78	35.62	1.66	34.68	1.97	34.87	1.74	35.50	1.72	34.71	1.80
Chest circumference	Ch C	89.77	4.71	90.29	4.75	91.24	6.57	91.91	6.23	90.11	4.81	91.35	6.68
Abdomen circumference	Ab C	80.51	5.88	82.55	5.80	84.02	8.57	86.99	8.85	81.86	5.92	84.51	8.69
Calf circumference	Cf C	33.43	1.98	33.59	2.00	33.41	2.73	33.76	2.64	33 54	2.01	33.47	2.70
Forearm circumference	FmC	25.84	1.50	25.86	1.44	25.53	1.69	25.31	1.25	25.80	1.46	25.50	1.62
Indexes													
Wertheimer index		274.55	31.99	268.42	33.48	257.09	40.40	254.50	37.28	270.51	33.37	256.68	40.15
Pignet index		17.02	10.15	17.40	11.02	16.29	13.58	14.51	14.57	17.27	11.03	16.00	13.35
Ht./wt. ratio $\left(\frac{\text{Ht. in cm.}}{\text{Wt. in kg.}}\times 100\right)$		269.28	26.57	267.16	25.41	269.13	36.35	265.32	34.05	267.89	26.33	268.50	36.32

[1] 6 cases in age group 60–72 included in total, but not listed separately.
[2] "S. D." is the standard deviation. This is a measure of variability based on the formula, $\sqrt{\frac{\Sigma d^2}{N}}$, where Σd^2 is the sum of the squared deviation from the mean and N is the number of cases.

TABLE 2.—*Comparison of 20-year age groups*

Measure	Ages 20–39 N-361 Mean	Ages 40–59 N-133 Mean	Difference	Critical ratio[1]
S	171.94	172.01	0.07	0.11
W	64.51	65.38	.86	.87
U. W	68.65	70.80	2.15	1.97
G. W	74.11	77.50	3.38	2.74
L. L	86.40	86.19	.22	.44
T. H	57.55	57.76	.21	.70
T. Ch	27.89	27.83	.06	.29
Sg. Ch	20.27	21.24	.97	4.92
Hd. C	56.77	56.83	.06	.39
N. C	35.50	34.71	.79	4.21
Ch. C	90.11	91.35	1.24	1.91
Ab. C	81.86	84.51	2.66	3.17
Cf. C	33.54	33.47	.07	.25
Fm. C	25.86	25.50	.36	2.15
Indexes				
Wertheimer	270.51	256.68	13.84	3.42
Pignet	17.27	16.00	1.27	.95
Ht./wt	267.89	268.50	.61	.17

[1] The critical ratio expresses the ratio of the difference between the two means to the standard error of that difference. A ratio of 3 or more is taken to indicate a true difference between the means, although a ratio of 2 may be considered as indicative (977 chances in 1,000 that a true difference exists).

There is a statistically significant difference between the older and younger groups with respect to the Wertheimer-Hesketh index (*34*) of body build, whereas the height-weight and Pignet indexes show no significant differences. The Wertheimer-Hesketh index is based on

the relationship of trunk volume to leg length without making direct use of body weight. The difference between the old and the young groups with respect to this index would be expected in light of the greater trunk development of the older group.

Table 3 presents the distribution of body types according to the subjective and Wertheimer-Hesketh classifications. The athletic type predominates with both classifications, showing a slight predominance of cases toward the pyknic end of the distribution. Table 3 also presents body-type groupings on Illinois convicts as found by Mohr and Gundlach (*23*). It may be noted that the addicts tend more toward the pyknic end of the distribution than do the convicts.

TABLE 3.—*Body type of the drug addict and comparison with convicts*

Type	Drug addicts, Wertheimer index [1]		Drug addicts, subjective rating [3]		Convicts (from Mohr and Gundlach (*23*)), subjective rating
	Admission	Recheck [2]	Admission	Recheck [2]	
	N-400	N-127	N-400	N-127	N-485
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
Pyknic	28	47	15	15	19
Pyknoid	-------	-------	11	27	20
Athletic	53	45	45	42	27
Athletic-asthenic	--------	-------	9	9	15
Asthenic	19	8	4	1	19
Eunuchoid	-----------	-----------	3	3	-----------
Unclassified	-----------	-----------	13	3	-----------

[1] See page 1957 for Wertheimer-Hesketh formula
[2] After 5½ months
[3] See page 1956 for statement of items on which subjective ratings are based

DISCUSSION OF RESULTS

Before comparing these body measures and indexes with those of other groups, the question of reliability of the present findings should be considered. As mentioned previously, 127 cases were recalled 5½ months later for reexamination. A comparison of the first and second measures should give an indication of the reliability of the measurements. Coefficients of correlation, means, and mean differences are shown in table 4. With the exception of trunk height, all of the measures show an increase after 5½ months. The high coefficients of correlation indicate that the increase is general, with the individuals of the group retaining their respective positions. When we eliminate those patients who gained more than 2.3 kilograms on the second examination, the coefficients of correlation increase and the mean differences decrease (table 5). This would seem to indicate that the large increases in weight significantly affect other body measures. Both sets of correlations, however, indicate that these measures are reliable.

TABLE 4.—*Reliability of anthropometric measures*

(Coefficient of correlation between measurements made at time of admission and measurements made 5½ months later—all 127 individuals remeasured. N-127)

	Coefficient of correlation	First examination mean (on admission)	Second examination mean (5½ months later)	Mean difference
Wt. (kg.)	0.89	65.84	69.20	3.36
Ht. (cm.)	.98	171.07	171.24	.17
L. L. (before D. for ht.)	.94	90.29	90.39	.09
Tk. H. (cm.)	.82	57.21	57.01	.21
T. Ch. (cm.)	.89	27.72	28.09	.37
S. Ch (cm.)	.85	20.56	21.41	.85
N. C. (cm.)	.78	35.65	36.02	.37
Ch. C. (cm.)	.89	91.59	93.48	1.89
Ab. C. (cm.)	.87	83.38	85.35	1.97
Cf. C. (cm.)	.85	33.50	34.54	1.03
Fm. C. (cm.)	.82	25.80	26.76	.96
Hd. C. (cm.)	.94	56.58	56.70	.13
Wertheimer index	.91	262.70	251.06	11.64
Pignet index	.88	15.40	9.98	5.42
Ht./wt.	.88	265.00	249.80	15.20

TABLE 5.—*Reliability of anthropometric measures*

(Means and coefficients of correlation in subjects changing 2.3 kg. or less. N-41)

	Coefficient of correlation	First examination (on admission)	Second examination (5½ months later)	Mean difference
Wt. (kg.)	0.98	66.47	66.81	0.34
Ht. (cm.)	.99	170.30	170.60	.30
L. L. (before D. for ht.)	.89	89.15	89.50	.35
Tk. H. (cm.)	.91	57.80	37.48	.33
T. Ch. (cm.)	.93	27.78	28.00	.23
S. Ch. (cm.)	.86	21.08	21.65	.58
Hd. C. (cm.)	.97	56.78	56.70	.08
N. C. (cm.)	.92	35.25	35.43	.18
Ch. C. (cm.)	.91	92.10	92.70	.60
Ab. C. (cm.)	.92	82.90	82.40	.50
Cf. C. (cm.)	.90	33.53	33.95	.42
Fm. C. (cm.)	.94	25.78	26.28	.50
Wertheimer index	.84	257.68	252.30	5.38
Pignet index	.96	13.70	12.10	1.60

In table 6 the drug addict is compared with other groups on the basis of height and weight. In height, the addict population is equal to Hooton's convict group and taller than United States Army Draft (1918) (*6*) and the Illinois convicts reported by Gray (*12*). The addicts are slightly shorter than the Illinois convicts reported by Mohr and Gundlach and markedly below Hooton's "civil check samples" (*15*), Columbia University students (*23*), and University of Chicago football players of 1929 (*13*). The admission weight of the addict is greater only than the Army group, but this would be expected in view of the fact that the Army group is approximately 10 years younger. The weight after 5½ months of incarceration, however, is greater than all the above convict populations but is lower than the weights reported for Hooton's civil check samples and the college groups. If proper allowance is made for the age difference

between the Army and addict groups, using the standards of the Metropolitan Life Insurance Co., there is slight difference between height and weight (addict recheck weight) in favor of the addict group. It should be noted here that the usual weight reported by the total addict group is 153 pounds (69.4 kg.), which is almost identical with the measured recheck weight (69.2 kg.).

TABLE 6.—*Comparison of drug addicts with other populations*

	Number	Mean age	Height (cm.)	Weight (kg.)
Drug addicts	400	36.7	171.0	64.8 (69.2)[1]
Convicts (Gray) (*12*)	587	33.9	170.4	66.9
Convicts (Hooton) (*15*)	4,188	30.7	171.9	68.5
Convicts (Mohr and Gundlach) (*23*)	486	28.8	172.6	68.3
Army recruits (Mohr and Gundlach) (*23*)	868,445	24.9	171.4	64.3 (68.4)[2]
Tennessee fireman (Hooton) (*15*)	146	38.9	172.8	78.0
Massachusetts civil sample (Hooton) (*15*)	167	30.7	173.0	73.8
Columbia students (Sommerville) (*23*)	110	----	173.8	67.6
Univ. of Chicago football players (Horace Gray) (*13*)	109	20.0	178.0	77.3

[1] Weight after 5½ months' incarceration. Reported usual weight 153 lb. (69.4 kg.).
[2] Estimate of Army weight at age 35, using Metropolitan Life Insurance Co. standards for height and weight by age. The insurance figures show an increase of 9 pounds (4.1 kg.) from age 25 to age 35 for persons 171 centimeters in height.

INTERPRETATIONS OF RESULTS

The data presented in table 1 and the comparisons with convict and Army groups (table 6) indicate no physical inferiority in the average narcotic addict as far as height and weight are concerned. The objective and subjective body-type classifications lend further support to this interpretation. The Pignet index of 16.8 on the total group (see table 1) is classified as "good constitution" according to the United States Army classification (*6*). The weight on admission to the institution is below the expected level as judged by the Metropolitan Life Insurance Co.'s standards, but the rapid general increase in weight following incarceration suggests that the admission weight is not representative of that which would be obtained under adequate dietary conditions.

With reference to body build, it appears that the narcotic drug addict is of normal proportions with a slight leaning toward the pyknic end of the distribution. This would place the addicts in the athletoid classification described by P. S. DeQ. Cabot (*4*) as having a sociobiological advantage over leptosomic and pyknosomic groups.

The findings of Kretschmer concerning the relationship of body build to temperament have not been entirely confirmed by later American investigators (Campbell (*5*), Klineberg (*17*), and Cabot (*4*)). The question is not completely settled, however, inasmuch as various workers, particularly those in European countries, continue to report their findings in support of Kretschmerian contentions (Enke (*8*), Willemse (*36*), Weissenfeld (*33*), and Burchard (*3*)). To the extent to which constitution-temperament relationships may hold true, the

narcotic drug addict would tend toward extroversion, since pyknics predominate over asthenics. These data substantiate an earlier report (*2*) on 162 cases and are in general agreement with the observations of Kolb (*18*), who speaks of addicts as having "outgoing" personalities.

CONCLUSIONS

On the basis of measurements taken on 400 native, white, male drug addicts, the following conclusions appear to be justified:

1. The narcotic drug addicts included in this study were average or slightly superior in height and weight.

2. There was an average gain in weight of a little more than 3 kg. after 5½ months of institutionalization.

3. The body build of this narcotic drug addict group was found to be within normal limits with a trend toward the pyknic end of the distribution.

4. The etiology of drug addiction cannot be ascribed in these cases to gross constitutional weakness.

REFERENCES

(*1*) Berman, Louis: The Glands Regulating Personality. Macmillan, New York, 1932.

(*2*) Brown, Ralph R.: Drug addiction in its relation to extroversion, ambiversion, and introversion. J. Applied Psychol., **19**: 555–563 (1935).

(*3*) Burchard, E. M. L.: Physique and psychosis: An analysis of the postulated relationship between bodily constitution and mental disease syndrome. Univ. of Pittsburgh Bull., **32**: 1–10 (1935).

(*4*) Cabot, P. S. DeQ.: The relationship between characteristics of personality and physique in adolescents. Genetic Psychology Monographs, Vol. 20, No. 1, 1938.

(*5*) Campbell, Katherine J.: Relation of types of physique to types of mental diseases. J. Abnorm. and Social Psychol., **27**: 147–151 (1932).

(*6*) Davenport, C. B., and Love, A. G.: Army Anthropology. U. S. Government Printing Office, Washington, D. C., 1921.

(*7*) Draper, George: The psychological panel. Am. J. of Med. Sci., **174**: 299 (1927).

(*8*) Enke, W.: Experimental psychologische Studien zur Konstitutionsforschung. Ztschr. f. d. ges. Neurol. u. Psychiat., **114**: 770–794 (1928).

(*9*) Farber, M. L.: A critique and an investigation of Kretschmer's theory. J. Abnorm. and Social Psychol., **33**: 398–404 (1938).

(*10*) Freeman, Walter: Human Constitution. Chapter 10, The Problem of Mental Disorder, by Madison Bently (Chairman) and E. V. Cowdry. McGraw-Hill, New York, 1934.

(*11*) Garrett, H. F., and Kellogg, W. N.: The relation of physical constitution to general intelligence, social intelligence and emotional instability. J. Exp. Psych., **11**: 113–129 (1928).

(*12*) Gray, Horace: Body build in Illinois convicts with special reference to age. J. Crim. Law and Criminol., **25**: 554–575 (1934).

(*13*) Gray, Horace: Body build of football players. Research Quart., **7**: 47–57 (October 1936).

(*14*) Harris, J. A., Jackson, C. M., Paterson, D. G., and Scammon, R. E.: The Measurement of Man. Univ. of Minnesota Press, 1930.

(*15*) Hooton, E. A.: The American Criminal: An Anthropological Study. Vol. 1, The Native White Criminal of Native Parentage. Harvard Univ. Press, 1939.

(*16*) Hrdlicka, A.: Anthropometry. Wistar Institute of Anatomy-Biology, Philadelphia, 1920.

(17) Klineberg, O., Asch, S. E., and Block, H.: An experimental study of constitutional types. Genetic Psychology Monographs, 16: 140-221 (1934).
(18) Kolb, Lawrence: Types and characteristics of drug addicts. Ment. Hyg., 9: 300-313 (1925).
(19) Kretschmer, E.: Physique and Character; an Investigation of the Nature of Constitution and of the Theory of Temperament. Harcourt, Brace and Co., New York, 1925.
(20) Light, Arthur B., Torrance, Edward G., Karr, Walter G., Fry, Edith G., and Wolff, William A.: Opium addiction; physical characteristics and physical fitness of addicts during administration of morphine. Arch. Int. Med., 43: 326-334 (1929).
(21) McDougall, William A.: A chemical theory of temperament applied to introversion and extroversion. J. Abnorm. and Social Psychol., 24: 293-309 (1929).
(22) Martin, R.: Lehrbuch der Anthropologie. G. Fischer, Jena, 1928.
(23) Mohr, G. J., and Gundlach, R. H.: A further study of the relation between physique and performance in criminals. J. Abnorm. and Social Psychol., 24: 91-103 (1929).
(24) Morton, N. W.: Personality tendencies and physique. J. Abnorm. and Social Psychol., 30: 439-442 (1936).
(25) Naccarati, S., and Garrett, H. E.: The relation of morphology to temperament. J. Abnorm. and Social Psychol., 19: 263 (1924).
(26) Naccarati, S.: The morphologic aspect of intelligence. Arch. Psychol., Vol. 6, No. 45, 1921.
(27) Pende, Nicola: Constitutional Inadequacies; an Introduction to the Study of Abnormal Constitutions. Lea and Febiger, Philadelphia, 1928.
(28) Report of the Mayor's Committee on Drug Addiction to the Hon. Richard C. Patterson, Jr., Commissioner of Correction, New York City. Am. J. Psychiat., 10: 433-538 (1930).
(29) Roback, A. A.: The Psychology of Character. Harcourt, Brace and Co., New York, 1931.
(30) Schwartz, Louis, Britten, Rollo H., and Thompson, Lewis R.: Studies in physical development and posture. Pub. Health Bull. No. 199, U. S. Government Printing Office, Washington, D. C., 1931.
(31) Sullivan, L. R.: Essentials of Anthropology. Am. Museum of Natural History, New York, 1928.
(32) Terry, Charles E., and Pellens, Mildred: The Opium Problem. Bureau of Social Hygiene, New York, 1928.
(33) Weissenfeld, F.: New points of view concerning constitutional types. Ztschr. f. d. ges. Neurol. u. Psychiat., 156: 432-478 (1936).
(34) Wertheimer, F. I., and Hesketh, Florence E.: The Significance of the Physical Constitution in Mental Disease. The Williams and Wilkins Co., Baltimore, 1926.
(35) Wertheimer, F. I., and Hesketh, Florence E.: A minimum scheme for the study of the morphologic constitution in psychiatry. Arch. Neurol. and Psychiat., 17: 93-98 (1927).
(36) Willemse, W. A.: Constitution Types in Delinquency. Harcourt, Brace and Co., New York, 1932.
(37) Wilson, D. P.: A Twenty Months' Psychological Study of Fifteen Hundred Offenders of the Harrison Narcotic Laws. U. S. Public Health Service (unpublished report), 1933.

COURT DECISION ON PUBLIC HEALTH

Compensation under workmen's compensation act awarded for tuberculosis.—(North Carolina Supreme Court; *MacRae* v. *Unemployment Compensation Commission of North Carolina,* 9 S. E. (2d) 595; decided June 19, 1940.) The plaintiff sought compensation under the North Carolina Workmen's Compensation Act for tuberculosis which developed while in the employ of the defendant State unemployment compensation commission. It appeared that the plaintiff worked in close proximity to another employee who had active pulmonary tuberculosis

and who coughed frequently. On one occasion while they were working across a very narrow table or desk the tuberculous employee unexpectedly and involuntarily coughed directly into the face of the plaintiff with the result that the spray or sputum entered the plaintiff's mouth. Shortly thereafter the plaintiff commenced to have symptoms of tuberculosis and about 3½ months after the said incident was found to be suffering from pulmonary tuberculosis. The compensation law provided that "injury and personal injury" should mean only injury by accident arising out of and in the course of the employment and should not include a disease in any form except where it resulted naturally and unavoidably from the accident.

The view of the supreme court was that the plaintiff's disease was the result of an injury by accident within the meaning of the said statutory provision. The court said that the plaintiff's disability was directly attributable to his infection when the other employee involuntarily and unexpectedly coughed spray and sputum into plaintiff's face and mouth. "Such coughing was untoward, unfortunate, and unusual in its proximity to and its effect upon plaintiff. * * * This overt, positive action is sufficient to satisfy the definition of accident." And later in the opinion it was stated that the court thought that "plaintiff's disease was proximately produced by infection from germs transmitted him in droplets of spray and sputum coughed up and expectorated into his face and mouth by a negligent fellow-employee in the course of his employment" and that "the unusual circumstances and conditions under which said injury was produced constituted an accident arising out of his employment."

DEATHS DURING WEEK ENDED OCTOBER 12, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 12, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,764	7,593
Average for 3 prior years	7,820	
Total deaths, first 41 weeks of year	345,231	339,048
Deaths under 1 year of age	499	488
Average for 3 prior years	515	
Deaths under 1 year of age, first 41 weeks of year	20,566	20,554
Data from industrial insurance companies:		
Policies in force	64,819,862	66,584,285
Number of death claims	10,763	8,774
Death claims per 1,000 policies in force, annual rate	8.7	6.9
Death claims per 1,000 policies, first 41 weeks of year, annual rate	9.7	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 19, 1940

Summary

For the country as a whole, there was no unusual prevalence of any of the 9 communicable diseases reported weekly by the State health officers, with the exception of poliomyelitis, although the week shows slightly increased incidence in each of these diseases except poliomyelitis and typhoid fever.

Of the 514 cases of poliomyelitis reported for the current week, as compared with 517 for the preceding week and a 5-year (1935–39) median of 246, the North Central and South Atlantic States reported 397, or 77 percent. The number of cases reported currently is higher than that for the corresponding week in any of the 5 preceding years.

Texas reported 231 cases of influenza and South Carolina reported 103 cases. The highest incidence of measles appears to be in the New England, Middle Atlantic, and East North Central States, and of scarlet fever, in the North Central, Atlantic, and South Central States. Only 1 case of Rocky Mountain spotted fever was reported (in Virginia), and 43 cases of endemic typhus fever, of which 14 were in Georgia and 6 each in Alabama and Mississippi.

The Bureau of the Census reports 7,632 deaths in 88 major cities of the United States for the current week, as compared with 7,764 for the preceding week, and with a 3-year (1937–39) average of 8,026 for the corresponding week. The total deaths in these cities for the first 42 weeks of the current year is 352,863, as compared with 346,894 for the corresponding period in 1939.

259729°—40——3

Telegraphic morbidity reports from State health officers for the week ended October 19, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	Oct. 19, 1940	Oct. 21, 1939		Oct. 19, 1940	Oct. 21, 1939		Oct. 19, 1940	Oct. 21, 1939		Oct. 19, 1940	Oct. 21, 1939	
NEW ENG.												
Maine	0	0	3	------	1	1	63	1	18	0	1	0
New Hampshire	0	0	0	------	------	------	0	5	2	0	0	0
Vermont	0	0	0	------	------	------	10	7	3	0	0	0
Massachusetts	9	7	3	------	------	------	143	71	68	2	1	1
Rhode Island	1	0	0	------	------	------	1	29	1	0	1	1
Connecticut	0	0	2	1	------	2	2	6	8	0	0	0
MID. ATL.												
New York	14	17	19	[1] 2	[1] 11	[1] 11	138	135	91	1	0	8
New Jersey	9	4	11	3	5	5	84	8	15	0	0	0
Pennsylvania	12	15	27	------	------	------	308	18	45	2	6	4
E. NO. CEN.												
Ohio [2]	21	33	45	19	1	4	14	9	11	1	1	7
Indiana	12	23	25	3	6	14	9	3	5	0	1	1
Illinois	18	27	30	2	2	9	78	11	13	1	4	3
Michigan [3]	2	5	13	1	------	------	133	0	36	0	1	1
Wisconsin	0	2	5	35	15	30	179	20	20	3	0	0
W. NO. CEN.												
Minnesota	0	4	14	------	1	1	0	8	8	0	0	0
Iowa	5	2	7	1	------	------	26	8	3	0	1	0
Missouri	10	11	29	------	------	27	5	4	7	0	0	1
North Dakota	6	0	1	7	2	------	1	1	1	1	0	0
South Dakota	0	1	1	------	------	------	4	28	8	0	0	0
Nebraska	3	1	5	------	------	------	14	1	1	1	0	0
Kansas	1	8	8	1	9	3	8	33	2	1	1	0
SO. ATL.												
Delaware	1	0	1	------	------	------	2	0	0	0	0	0
Maryland [3]	3	8	9	1	7	10	2	1	4	0	0	2
Dist. of Col.	0	8	6	------	------	------	0	1	1	0	0	0
Virginia [4]	16	80	77	70	33	------	35	6	6	4	0	4
West Virginia	8	18	40	15	15	15	2	3	3	1	2	1
North Carolina [2]	67	143	143	2	5	4	3	93	80	0	1	2
South Carolina [2]	17	32	26	103	200	169	2	0	3	0	0	1
Georgia [2]	28	53	53	16	34	------	1	0	0	0	0	0
Florida [2]	8	3	11	1	2	2	0	19	5	0	3	0
E. SO. CEN.												
Kentucky	17	11	32	18	3	9	19	2	3	0	1	2
Tennessee [2]	16	40	65	16	22	22	0	12	8	1	0	1
Alabama [2]	28	41	41	16	41	26	3	0	3	0	7	2
Mississippi [2] [3]	16	24	24	------	------	------	------	------	------	1	0	0
W. SO. CEN.												
Arkansas	14	29	26	16	18	18	3	2	1	0	0	0
Louisiana [2]	12	28	26	2	1	6	0	1	3	0	0	1
Oklahoma	22	9	10	30	26	36	2	2	2	0	0	0
Texas [2]	39	28	48	231	140	123	17	38	4	1	1	2
MOUNTAIN												
Montana	1	13	1	14	15	15	14	13	13	0	0	0
Idaho	2	0	0	------	------	1	3	0	19	1	0	0
Wyoming	0	1	1	------	------	------	5	98	1	1	0	0
Colorado	8	9	9	7	9	------	19	19	3	0	0	0
New Mexico	0	3	8	------	2	1	7	2	13	0	0	0
Arizona	2	3	5	81	53	40	16	0	0	0	1	0
Utah [3]	1	0	0	6	7	------	3	4	4	1	0	0
Nevada [5]	0	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	5	2	2	------	------	------	5	240	18	0	1	0
Oregon	5	1	1	14	4	15	12	17	7	0	0	0
California	23	22	42	14	18	18	48	105	105	1	2	3
Total	482	769	908	748	717	705	1,503	1,084	1,084	25	37	67
42 weeks	11,697	16,960	20,021	174,065	156,030	144,721	235,896	353,771	353,771	[6] 1,347	1,625	4,672

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 19, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Oct. 19, 1940	Oct. 21, 1939		Oct. 19, 1940	Oct. 21, 1939		Oct. 19, 1940	Oct. 21, 1939		Oct. 19, 1940	Oct. 21, 1939	
NEW ENG.												
Maine	0	0	1	4	8	14	0	0	0	0	4	2
New Hampshire	0	0	1	6	6	3	0	0	0	0	0	0
Vermont	0	0	0	9	3	4	0	0	0	1	0	0
Massachusetts	1	4	4	74	54	72	0	0	0	2	1	3
Rhode Island	1	0	0	0	2	7	0	0	0	0	4	1
Connecticut	0	1	1	23	14	23	0	0	0	1	2	2
MID. ATL.												
New York	13	63	29	123	117	187	0	0	0	14	11	20
New Jersey	11	9	5	66	53	51	0	0	0	2	3	3
Pennsylvania	7	28	8	122	179	208	0	0	0	20	7	42
E. NO. CEN.												
Ohio [2]	36	6	3	106	174	186	0	1	0	9	15	16
Indiana	21	4	3	76	103	120	0	8	2	4	4	4
Illinois	42	5	7	168	156	194	3	1	1	5	26	11
Michigan [3]	81	37	12	147	165	165	0	1	0	3	7	7
Wisconsin	29	7	3	97	90	120	0	1	1	1	0	1
W. NO. CEN.												
Minnesota	18	20	3	45	64	64	3	1	3	0	0	0
Iowa	55	12	7	52	52	66	0	1	2	3	3	4
Missouri	18	1	1	27	56	67	1	1	6	3	15	11
North Dakota	3	1	1	11	14	19	4	0	0	2	0	1
South Dakota	4	1	1	18	24	24	0	0	1	0	0	1
Nebraska	8	2	1	19	8	23	1	1	1	0	0	0
Kansas	23	2	1	62	75	80	0	0	0	3	3	2
SO. ATL.												
Delaware	0	1	0	1	5	5	0	0	0	1	4	2
Maryland [3]	0	2	2	35	41	41	0	0	0	8	6	9
Dist. of. Col	0	1	1	14	12	12	0	0	0	0	1	1
Virginia [4]	16	2	2	32	44	42	0	0	0	12	10	10
West Virginia	37	3	1	38	102	86	0	0	0	3	7	10
North Carolina [2]	5	9	3	70	84	88	0	0	0	5	5	8
South Carolina [2]	0	0	1	9	13	14	0	0	0	4	8	6
Georgia [2]	0	1	1	53	35	28	0	0	0	17	6	8
Florida [2]	1	1	1	1	11	8	0	0	0	2	2	2
E. SO. CEN.												
Kentucky	12	25	4	56	52	85	0	0	0	11	11	12
Tennessee [2]	1	1	1	82	62	62	1	0	0	5	14	19
Alabama [2]	2	1	1	31	53	31	0	0	0	6	2	4
Mississippi [2, 3]	0	0	1	20	10	18	0	0	0	5	2	7
W. SO. CEN.												
Arkansas	1	3	3	26	17	17	0	2	0	19	9	7
Louisiana [2]	5	0	1	15	8	8	0	0	0	8	12	14
Oklahoma	3	2	0	23	20	20	0	1	1	5	5	12
Texas [2]	7	11	3	40	27	45	0	0	1	13	27	27
MOUNTAIN												
Montana	4	0	0	14	28	28	0	0	3	2	1	2
Idaho	5	1	1	14	9	21	0	0	0	4	2	2
Wyoming	1	0	0	4	4	7	0	2	0	0	0	0
Colorado	6	12	1	15	30	27	1	1	1	3	2	3
New Mexico	2	9	2	2	8	16	0	0	0	9	6	16
Arizona	0	1	0	1	5	7	0	0	0	0	3	3
Utah [2]	2	5	1	6	17	17	0	0	0	0	0	0
Nevada [5]	0	------	------	0	------	------	0	------	------	0	------	------
PACIFIC												
Washington	18	2	2	23	29	29	0	1	1	4	6	4
Oregon	5	4	4	16	13	15	1	0	0	0	7	3
California	10	34	17	89	121	154	0	5	3	12	15	10
Total	514	334	246	1,985	2,277	2,816	15	28	51	231	278	379
42 weeks	7,949	5,998	5,998	123,251	128,755	180,486	2,061	8,885	8,540	8,160	11,003	12,339

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 19, 1940, and comparison with corresponding week of 1939 and 5-year median— Continued.

Division and State	Whooping cough, Week ended Oct. 19, 1940	Whooping cough, Week ended Oct. 21, 1939	Division and State	Whooping cough, Week ended Oct. 19, 1940	Whooping cough, Week ended Oct. 21, 1939
NEW ENG.			SO. ATL.—continued		
Maine	8	48	Georgia [2]	9	18
New Hampshire	1	0	Florida [2]	1	3
Vermont	1	41	E. SO. CEN.		
Massachusetts	175	76	Kentucky	56	26
Rhode Island	6	19	Tennessee [2]	31	46
Connecticut	88	55	Alabama [2]	9	14
MID. ATL.			Mississippi [2] [3]	----------	----------
New York	329	217	W. SO. CEN.		
New Jersey	123	76	Arkansas	12	29
Pennsylvania	558	297	Louisiana [2]	8	8
E. NO. CEN.			Oklahoma	12	0
Ohio [2]	261	80	Texas [2]	119	27
Indiana	28	37	MOUNTAIN		
Illinois	149	149	Montana	3	8
Michigan [3]	371	85	Idaho	4	0
Wisconsin	113	109	Wyoming	0	1
W. NO. CEN.			Colorado	13	8
Minnesota	42	43	New Mexico	17	23
Iowa	16	13	Arizona	12	9
Missouri	7	15	Utah [3]	7	48
North Dakota	34	3	Nevada [5]	0	----------
South Dakota	0	3	PACIFIC		
Nebraska	2	7	Washington	80	10
Kansas	87	3	Oregon	13	11
SO. ATL.			California	249	111
Delaware	3	3			
Maryland [3]	93	37	Total	3,329	1,988
Dist. of Col.	2	7			
Virginia [4]	31	51	42 weeks	131,501	147,861
West Virginia	25	35			
North Carolina [2]	99	67			
South Carolina [2]	22	12			

[1] New York City only.
[2] Typhus fever, week ended October 19, 1940, 43 cases as follows: Ohio, 1; North Carolina, 1; South Carolina, 5; Georgia, 14; Florida, 4; Tennessee, 1; Alabama, 6; Mississippi, 6; Louisiana, 2; Texas, 3.
[3] Period ended earlier than Saturday.
[4] Rocky Mountain spotted fever, week ended October 19, 1940, Virginia, 1 case.
[5] A delayed report from Nevada for the week ended October 12, 1940, showed 1 case of meningococcus meningitis and 1 case of poliomyelitis.

WEEKLY REPORTS FROM CITIES

City reports for week ended October 5, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	146	61	19	188	368	526	3	326	60	920	------
Current week [1]	58	48	15	296	253	344	2	310	43	863	------
Maine:											
Portland	0	------	0	0	1	1	0	0	0	4	28
New Hampshire:											
Concord	0	------	0	0	0	2	0	0	0	0	9
Manchester	0	------	0	0	1	0	0	0	0	0	21
Nashua	0	------	0	0	0	0	0	0	0	0	9
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	8
Rutland	0	------	0	0	0	0	0	0	0	0	5
Massachusetts:											
Boston	3	------	0	10	10	7	0	6	1	54	202
Fall River	0	------	0	1	0	1	0	1	0	4	27
Springfield	0	------	0	0	1	6	0	0	0	1	34
Worcester	0	------	0	43	4	1	0	0	1	2	41
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	11
Providence	2	------	1	1	2	1	0	0	0	7	80
Connecticut:											
Bridgeport	0	------	0	1	0	1	0	0	0	1	15
Hartford	0	------	0	0	0	1	0	0	0	5	32
New Haven	0	------	0	0	0	0	0	0	0	26	38
New York:											
Buffalo	0	------	1	2	8	5	0	8	0	7	133
New York	13	8	2	30	33	32	0	70	4	86	1,356
Rochester	0	------	0	0	1	1	0	1	1	9	66
Syracuse	0	------	0	0	1	1	0	0	0	1	45
New Jersey:											
Camden	0	------	1	14	1	4	0	1	1	4	34
Newark	0	------	0	5	1	4	0	4	2	14	107
Trenton	0	------	0	0	2	0	0	3	0	1	30
Pennsylvania:											
Philadelphia	1	1	0	77	9	18	0	24	2	75	428
Pittsburgh	0	1	1	0	12	8	0	6	0	17	171
Reading	0	------	0	3	2	0	0	1	0	32	18
Scranton	0	------	------	0	------	1	0	------	0	2	------
Ohio:											
Cincinnati	1	1	0	0	0	3	0	3	0	7	126
Cleveland	1	11	0	2	7	7	0	10	0	53	162
Columbus	1	------	0	0	2	4	0	0	0	9	94
Toledo	0	------	0	1	1	6	0	5	1	9	67
Indiana:											
Anderson	0	------	0	0	1	0	0	1	0	0	15
Fort Wayne	0	------	0	0	0	2	0	1	0	0	25
Indianapolis	1	------	1	0	4	2	0	7	0	5	108
Muncie	0	------	0	0	3	0	0	0	0	2	12
South Bend	0	------	0	0	1	0	0	1	0	0	10
Terre Haute	0	------	0	0	0	0	0	0	0	0	17
Illinois:											
Alton	0	------	0	0	0	14	0	1	0	0	7
Chicago	5	1	1	20	22	57	0	32	1	63	628
Elgin	0	------	0	0	0	1	0	0	0	2	9
Moline	0	------	0	1	0	0	0	0	0	0	9
Springfield	0	------	0	0	2	0	0	0	0	2	17
Michigan:											
Detroit	3	1	0	47	4	35	0	19	2	121	246
Flint	0	------	0	2	1	1	0	0	0	4	22
Grand Rapids	0	------	0	1	1	7	0	0	0	35	33
Wisconsin:											
Kenosha	0	------	0	0	0	2	0	0	0	1	9
Madison	0	------	0	1	0	0	0	1	0	0	18
Milwaukee	0	------	0	10	3	20	0	4	8	8	84
Racine	0	------	0	1	0	3	0	1	0	0	9
Superior	0	------	0	0	0	2	0	0	0	0	9

[1] Figures for Barre, Vt., and Wilmington, N. C., estimated; reports not received.

City reports for week ended October 5, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	0	0	0	2	0	0	1	16
Minneapolis	2	------	0	1	3	2	0	1	1	9	103
St. Paul	0	------	0	0	4	5	0	3	0	9	56
Iowa:											
Cedar Rapids	0	------	------	0	------	3	0	------	0	1	------
Davenport	1	------	------	0	------	3	0	------	0	0	------
Des Moines	0	------	0	0	0	4	0	0	1	0	22
Sioux City	0	------	------	0	------	0	0	------	0	1	------
Waterloo	0	------	------	0	------	1	0	------	0	0	------
Missouri:											
Kansas City	0	------	0	0	3	3	0	6	2	10	104
St. Joseph	0	------	0	0	1	0	0	0	1	0	10
St. Louis	2	------	0	1	14	10	0	7	3	3	212
North Dakota:											
Fargo	0	------	------	0	------	3	0	------	0	3	------
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	1	0	0	0	0	0	1	8
South Dakota:											
Aberdeen	0	------	------	0	------	1	0	------	0	0	------
Sioux Falls	0	------	0	0	0	5	0	0	0	0	7
Nebraska:											
Lincoln	0	------	------	1	------	1	0	------	0	2	------
Omaha	0	------	0	0	3	7	0	2	0	0	40
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	5
Topeka	0	------	0	0	2	3	0	2	0	0	29
Wichita	0	------	0	1	6	1	0	0	1	2	25
Delaware:											
Wilmington	0	------	0	1	2	0	0	1	0	5	33
Maryland:											
Baltimore	2	1	0	2	8	4	0	14	1	66	207
Cumberland	0	------	1	0	0	0	0	0	0	0	11
Frederick	0	------	0	0	0	3	0	0	0	0	4
Dist. of Col.:											
Washington	0	------	0	0	6	4	0	13	1	6	165
Virginia:											
Lynchburg	1	------	0	0	0	0	0	0	0	2	10
Norfolk	1	------	0	0	0	1	0	1	1	0	28
Richmond	0	------	0	0	2	3	0	0	1	0	53
Roanoke	0	------	0	0	0	0	0	1	0	2	19
West Virginia:											
Charleston	1	------	0	0	3	0	0	0	0	0	14
Wheeling	0	------	0	1	1	0	0	0	1	5	12
North Carolina:											
Gastonia	0	------	------	1	------	0	0	------	0	1	------
Raleigh	0	------	0	0	1	0	0	1	0	0	18
Wilmington	------	------	------	------	------	------	------	------	------	------	------
Winston-Salem	1	------	0	0	0	1	0	1	0	4	17
South Carolina:											
Charleston	0	1	0	1	1	1	0	0	2	0	15
Florence	0	------	0	0	0	0	0	0	0	0	4
Greenville	0	------	0	0	1	0	0	0	0	1	13
Georgia:											
Atlanta	3	6	1	0	5	4	0	6	0	0	76
Brunswick	0	------	0	0	0	0	0	0	0	0	2
Savannah	0	------	0	0	1	0	0	0	0	0	26
Florida:											
Miami	0	------	0	0	1	0	0	2	0	0	36
Tampa	0	------	0	0	1	1	0	1	0	0	22
Kentucky:											
Ashland	1	------	0	0	1	0	0	0	0	0	6
Covington	0	------	0	1	0	8	0	1	0	0	9
Lexington	0	------	0	5	1	0	0	0	0	0	12
Louisville	0	------	0	0	0	4	0	2	0	11	50
Tennessee:											
Knoxville	1	------	0	0	0	1	0	0	0	0	20
Memphis	2	------	0	0	1	5	0	2	1	6	51
Nashville	0	------	1	1	4	4	0	2	1	0	47
Alabama:											
Birmingham	0	4	0	2	1	0	0	3	0	0	53
Mobile	1	------	0	0	0	2	0	0	0	0	26
Montgomery	1	------	------	0	------	0	0	------	1	7	------
Arkansas:											
Fort Smith	0	------	------	0	------	1	0	------	0	0	------
Little Rock	1	------	0	0	2	1	0	1	0	0	8
Louisiana:											
Lake Charles	0	------	0	0	0	1	0	0	0	0	1
New Orleans	2	------	0	1	10	4	0	2	8	0	153
Shreveport	1	------	0	0	1	1	0	0	1	0	24

City reports for week ended October 5, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Oklahoma:											
Oklahoma City	0	2	0	0	4	3	0	0	0	0	48
Tulsa	0	------	0	0	0	1	0	0	1	6	11
Texas:											
Dallas	0	------	0	0	1	2	0	1	0	2	65
Fort Worth	0	------	0	1	2	4	0	1	0	2	43
Galveston	0	------	0	0	0	0	0	0	0	0	10
Houston	0	------	1	0	2	2	0	3	0	0	79
San Antonio	1	1	1	0	3	0	0	7	0	3	61
Montana:											
Billings	0	------	0	0	0	1	0	0	0	0	8
Great Falls	0	------	0	0	2	0	0	0	0	0	7
Helena	0	------	0	0	0	1	0	0	0	0	2
Missoula	0	------	0	0	1	0	0	0	0	0	5
Idaho:											
Boise	0	------	0	0	2	1	0	0	0	0	3
Colorado:											
Colorado Springs	0	------	0	0	0	1	0	0	0	2	9
Denver	2	------	0	3	5	3	0	6	0	4	83
Pueblo	0	------	1	1	0	0	0	0	0	0	10
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	0	2	3	11
Utah:											
Salt Lake City	0	------	1	1	1	0	0	0	1	7	35
Washington:											
Seattle	3	------	0	0	3	6	0	4	0	3	88
Spokane	0	------	0	0	1	2	0	0	0	0	30
Tacoma	0	------	0	0	1	0	0	0	0	0	23
Oregon:											
Portland	2	1	0	1	7	3	0	3	0	1	74
Salem	0	------	------	0	------	1	0	------	0	0	------
California:											
Los Angeles	2	7	0	5	4	9	0	13	0	24	275
Sacramento	0	2	0	1	4	6	0	2	0	0	31
San Francisco	0	2	0	2	3	5	0	5	0	24	142

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	1	0	0
Rhode Island:			
Pawtucket	0	0	1
Providence	1	0	0
New York:			
Buffalo	0	1	0
New York	0	0	3
Pennsylvania:			
Philadelphia	0	0	3
Pittsburgh	0	0	1
Ohio:			
Cleveland	0	0	3
Columbus	0	0	2
Toledo	1	1	0
Indiana:			
Indianapolis	1	0	0
Illinois:			
Chicago	1	0	8
Michigan:			
Detroit	0	0	6
Grand Rapids	0	0	2
Wisconsin:			
Madison	0	0	1
Milwaukee	0	0	2
Minnesota:			
Minneapolis	0	0	3
St. Paul	0	0	1
Iowa:			
Des Moines	0	0	6
Sioux City	0	0	1
Waterloo	0	0	2
Missouri:			
Kansas City	0	0	6
St. Joseph	0	0	3

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
North Dakota:			
Grand Forks	0	0	1
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	2
Virginia:			
Lynchburg	0	0	1
Richmond	0	0	1
West Virginia:			
Charleston	0	0	1
Kentucky:			
Ashland	0	0	3
Lexington	0	0	2
Alabama:			
Birmingham	1	1	0
Oklahoma:			
Tulsa	0	0	1
Texas:			
Houston	0	0	2
Montana:			
Missoula	0	0	1
Colorado:			
Denver	0	0	1
Utah:			
Salt Lake City	0	0	2
Washington:			
Seattle	0	0	9
Tacoma	0	0	1
California:			
Los Angeles	0	0	2
San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: St. Louis, 1; Great Falls, 1; Sacramento, 1.

Pellagra.—Cases: Boston, 1; Charleston, S. C., 1; Savannah, 1; Montgomery, 1; Los Angeles, 1.

Typhus fever.—Cases: New York, 1; Charleston, S. C., 2; Savannah, 1; Miami, 1; Birmingham, 3; New Orleans, 1; Shreveport, 1; Galveston, 1; Houston, 1. Deaths: New Orleans, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended September 7, 1940.—During the week ended September 7, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				2	2					4
Chickenpox		2		13	38	15	9	1	8	86
Diphtheria		1	1	9	4	2				17
Dysentery									2	2
Influenza		14			8	3			10	35
Measles	8			12	97	4	5	82	18	171
Mumps			1	7	33	10	1	1	6	59
Pneumonia		2			5	1			4	12
Poliomyelitis				10	4	1				15
Scarlet fever		2		36	50	8		4	9	109
Tuberculosis	1	4	5	35	45	3				93
Typhoid and paratyphoid fever		1	1	20	1	2	1	1	1	28
Whooping cough				190	71	37	11	8	15	332

HAWAII

Influenza.—Under date of October 4, Senior Surgeon M. F. Haralson reported an outbreak of influenza in the Territory of Hawaii, principally in Honolulu, with the occurrence of 1,800 cases and 2 deaths on the Island of Oahu since September 26. On October 13, Dr. Haralson reported a total of 4,298 cases with 6 deaths. He stated that the disease was of mild type, the cases averaging about 3 days of acute illness. For the two weeks ended October 19 and 26, respectively, there were 1,532 and 1,585 cases reported with no deaths. For the latter week, 725 cases were reported on the island of Oahu.

Influenza is not reportable in Hawaii except when officially declared to be epidemic.

JAMAICA

Communicable diseases—4 weeks ended September 28, 1940.—During the 4 weeks ended September 28, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	6	15	Scarlet fever	1	1
Diphtheria	3	2	Tuberculosis	25	76
Dysentery	10	7	Typhoid fever	14	63
Puerperal sepsis		1			

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-July 1940	August 1940	September 1940—week ended—			
				7	14	21	28
ASIA							
China:							
Dairen	C	1	1				
Foochow	C		29	11			
Hong Kong	C		5	76	413	196	68
Macao	C		20	39	87	149	70
Manchuria	C		31				
Shanghai	C	92	240	45	42	21	16
Shantung Province	C	40	204				
India	C	32,069					
Bassein	C	164					
Bombay	C		5			1	
Calcutta	C	1,673	132	17	25	22	23
Cawnpore	C	21	270	26	8	2	2
Chittagong	C	4					
Madras	C	1					
Moulmein	C	16					
Porto Novo	C	1					
Rangoon	C	43					
Vizagapatam	C	16	4				
India (French)	C	34					
Indochina (French)	C	436					
Thailand	C	235					

PLAGUE

[C indicates cases; D, deaths]

Place		January-July 1940	August 1940	September 1940—week ended 7	14	21	28
AFRICA							
Algeria	C		4		1		2
Plague-infected rats			2				
Belgian Congo	C	20	1				
British East Africa:							
Kenya	C	7					
Uganda	C	124					
Egypt	C	[1] 409					
Madagascar	C	472					
Morocco.[2]							
Rhodesia, Northern	C	1					
Senegal:							
Dakar	D	[3] 1					
Thies	C	1					
Tivaouane	C	3					
Tunisia: Tunis	C			2			3
Plague-infected rats							1
Union of South Africa	C	25					
ASIA							
China:[4]							
Dutch East Indies: Java and Madura	C	247					
India	C	13,108					
Bassein	C	18					
Cochin	C	1					
Plague-infected rats		3					
Rangoon	C	5					
Indochina (French)	C	3					

See footnotes at end of table.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths]

Place		January-July 1940	August 1940	September 1940—week ended—			
				7	14	21	28
ASIA—continued							
Thailand:							
Bangkok	C	3					
Bisnulok Province	C	3					
Chingmai	C		3				
Dhonpuri Province	C	1					
Jayanad Province	C	3					
Kamphaeng Bajr Province	C	29					
Kanchanapuri Province	C	12					
Koan Kaen Province	C	5					
Nagara Svarga Province	C	30					
Noangkhay Province	C	4					
Sukhodaya Province	C	22					
EUROPE							
Portugal: Azores Islands	C	2					
SOUTH AMERICA							
Argentina:							
Catamarca Province	C		8				
Cordoba Province	C	[5] 21	9				
Jujuy Province	C	9					
Salta Province	C	8					
Santiago del Estero Province	C	30	16				
Tucuman Province	C	18	1				
Brazil:							
Alagoas State	C	5					
Pernambuco State	C	1					
Ecuador: El Oro Province	C		6				
Peru:							
Cajabamba Department	C	1					
Cajamarca Department	C	27					
Lambayeque Department	C	12					
Libertad Department	C	46					
Lima Department	C	44					
Piura Department	C	6					
Tumbes Department	C	[6] 18					
OCEANIA							
Hawaii Territory: Plague-infected rats		29	7		2	1	

SMALLPOX

Place		January-July 1940	August 1940	September 1940—week ended—			
				7	14	21	28
AFRICA							
Algeria	C	5					
Angola	C	71					
Belgian Congo	C	2,657	353				
British East Africa	C	25					
Dahomey	C	48					
French Guinea	C	13					
Gibraltar	C	[7] 1					
Ivory Coast	C	113					
Nigeria	C	1,866	103				
Niger Territory	C	594					
Nyasaland	C	57	3				
Portuguese East Africa	C	1					
Rhodesia:							
Northern	C		6				
Southern	C	191	5				
Senegal	C	134					
Sierra Leone	C	10					
Sudan (Anglo-Egyptian)	C	441	60	9	6	2	
Sudan (French)	C	1					
Union of South Africa	C	84	22				

See footnotes at end of table.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths]

Place		January–July 1940	August 1940	September 1940—week ended—			
				7	14	21	28
ASIA							
Arabia	C	255					
China	C	798	1				
Chosen	C	533					
Dutch East Indies—Sabang	C	4					
India	C	145,500					
India (French)	C	5					
India (Portuguese)	C	20					
Indochina (French)	C	1,033					
Iran	C	151					
Iraq	C	168	50	71	157	13	20
Japan	C	500					
Straits Settlements	C	1					
Sumatra	C	1					
Thailand	C	104	64	3		5	1
EUROPE							
Great Britain	C	2					
Greece	C	23					
Portugal	C	241	6				
Spain	C	557					
Turkey	C	139					
NORTH AMERICA							
Guatemala	C	21	14				
Mexico	C	53					
SOUTH AMERICA							
Bolivia	C	189					
Brazil	C	1					
Colombia	C	1,227	1				
Ecuador	C	4					
Peru	C	45					
Venezuela (alastrim)	C	150	13				

TYPHUS FEVER

Place		January–July 1940	August 1940	September 1940—week ended— 7	14	21	28
AFRICA							
Algeria	C	1,695	89				
Belgian Congo	C	1,210					
British East Africa	C	2					
Egypt	C	3,491	83	9	7	3	2
Eritrea	C	40					
Morocco	C	277					
Tunisia	C	515					
Union of South Africa	C	108					
ASIA							
China	C	2,030	36	13			
Chosen	C	359					
India	C	3					
Indochina (French)	C	2					
Iran	C	233					
Iraq	C	116	7	4	1		
Japan	C	2					
Palestine	C	70	39	5	4	5	2
Straits Settlements	C	6	1				
Sumatra	C	[3] 1					
Trans-Jordan	C	15					
EUROPE							
Bulgaria	C	134	5				
Germany	C	173	40				
Greece	C	28	1	1		3	1
Hungary	C	75	1			1	
Irish Free State	C	9	1				
Lithuania	C	115					
Rumania	C	1,232	11		2	2	1
Spain	C	14					
Turkey	C	503					
Yugoslavia	C	270	12				

See footnotes at end of table.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths]

Place		January–July 1940	August 1940	September 1940—week ended—			
				7	14	21	28
NORTH AMERICA							
Guatemala	C	255	14				
Mexico	C	172	8	3	4	1	1
Panama Canal Zone	C	3					
SOUTH AMERICA							
Bolivia	C	499					
Chile	C	233	3				
Ecuador	C	2					
Peru	C	[9] 304					
Venezuela	C	8	3				
OCEANIA							
Australia	C	10					
Hawaii Territory	C	17	2	1		1	

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–July 1940	August 1940	Sept. 7	14	21	28
AFRICA							
Cameroon: Nkongsamba	C	[10] 1					
French Equatorial Africa: Fort Archambault	C	[10] 1					
Gold Coast	C	1					
Ivory Coast	C	1	[10] 2				
Nigeria:							
Ibadan	C	1					
Oshogbo	C	[10] 1					
Togo (French)	C	1					
SOUTH AMERICA							
Brazil:							
Espirito Santo State	D	[11] 23					
Rio de Janeiro State	D	[11] 1					
Colombia:							
Antioquia Department—San Luis	D	2					
Caldas Department—							
La Pradera	D	1					
Samana	D	1					
Victoria	D	1					
Meta Department [12]	D		2				
Santander Department	D	1					

[1] Includes 5 cases of pneumonic plague.
[2] A report dated May 11, 1940, stated that there was an epidemic of bubonic plague in southern Morocco, where several hundred cases had been unofficially reported.
[3] Imported.
[4] Information dated July 7 states that up to July 6, 17 cases of plague had been reported near Tungliao, Hsingan Province, China; and a report dated July 13 states that an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh. Information dated Aug. 17, states that 45 cases of plague with 36 deaths have occurred in Nungen District and a telegram dated Oct. 2 states that 15 cases of bubonic plague with 3 deaths occurred in Hsinking, Manchuria.
[5] Includes 11 cases of pneumonic plague.
[6] Includes 3 suspected cases.
[7] Imported.
[8] July only.
[9] January to March inclusive.
[10] Suspected.
[11] Jungle type.
[12] During the week ended Oct. 5, 1940, 1 case of yellow fever was reported in Meta Department, Colombia.

X

Public Health Reports

VOLUME 55 **NOVEMBER 1, 1940** NUMBER 44

IN THIS ISSUE

Doctors' Calls Among Males and Females of Different Ages

Provisional Mortality Rates for the First 6 Months of 1940

Sinus Infection: Cause, Symptoms, Treatment, and Prevention

U.S. PUBLIC HEALTH SERVICE
* 1798 *

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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FREQUENCY AND VOLUME OF DOCTORS' CALLS AMONG MALES AND FEMALES IN 9,000 FAMILIES, BASED ON NATION-WIDE PERIODIC CANVASSES, 1928-31 [1]

By Selwyn D. Collins, *Principal Statistician, United States Public Health Service*

CONTENTS

Studies of medical care in this country have usually been built around the phenomenon of increasing care with ability to pay. The relationship of medical care to family income is of such paramount importance from a sociological point of view that other relationships have been neglected. For example, the volume of doctors' calls varies with age, sex, and marital status; the variations of this kind are greater for home calls and hospital days than for office calls. Children under 15 years of age are seldom taken to nonmedical practitioners, but above 20 years the use of this type of practitioner increases in frequency, particularly among women, with a peak at 45 to 64 years and a decline thereafter. Or again, the average uncomplicated case of typhoid fever receives 20.1 calls and of pneumonia 9.6 calls, as compared with 1.8 calls for an attended uncomplicated case of measles, and 1.6 calls for coryza. Although four-fifths of the illnesses in this study were attended by a doctor, 40 percent received only a single call, presumably for diagnosis or for diagnosis and a prescription.

[1] From Statistical Investigations, Division of Public Health Methods, National Institute of Health.

This is the sixteenth of a series of papers on sickness and medical care in this group of families (*1 15*). The survey of these families was organized and conducted by the Committee on the Costs of Medical Care, the tabulation was done under a cooperative arrangement between the Committee and the Public Health Service. Committee publications based on the results deal primarily with costs and Public Health Service publications primarily with the incidence of illness and the extent and kind of medical care, without regard to cost. As costs are meaningless without some knowledge of the extent and nature of the service received, there is inevitably some overlapping. The Committee staff, particularly Dr. I. S. Falk and Miss Margaret Klem, cooperated in the tabulation of the data.

Special thanks are due to Dr. Mary Gover, who assisted in the analysis, to Mrs. Lily Vanzee Welch, who was in immediate charge of tabulating the data, and to other members of the statistical staff of the Public Health Service for advice and assistance in the preparation of the study.

In contrast to sociological studies of medical care that consider income as the paramount variable, an investigation from these other points of view might be described as a quantitative study of medical care from the standpoint of epidemiology and clinical medicine. Every disease has certain epidemiological characteristics which can be determined only by its mass study in a population group; to such usual characteristics as age and sex incidence, seasonal or chronological variation, geographic spread, and duration in days of disability, in bed, or in a hospital, there might be added socio-epidemiological characteristics such as the proportion of illnesses that come to the attention of a physician and the calls or hospital days commonly received in the treatment of a case. Just as age distribution of a given disease varies under different circumstances, medical care of illness may be expected to vary under urban and rural conditions, with income or ability to purchase care, and with different systems of purchasing medical care.

I. SOURCE AND CHARACTER OF DATA

In the study of illness in a group of families in 18 States [2] that was made by the Committee on the Costs of Medical Care (*16*) and the United States Public Health Service, the record for each illness included all service received from physicians and other practitioners within the 12-month study period. Among the items recorded were type of attendant and the number of home, office, and clinic calls. Thus, data on doctors' calls in the whole canvassed population are available for the survey year.

The composition and characteristics of the group of 8,758 white families which were kept under observation for 12 consecutive months in the years 1928–31 have been considered in some detail in the first report in the series (*1*). These families, including a total of 39,185 individuals, resided in 130 localities in 18 States representing all geographic sections. Every size of community was included, from metropolitan districts to small industrial and agricultural towns and rural unincorporated areas.[3] With respect to income, the distribution was reasonably similar to the estimated distribution of the general population of the United States at the time of the survey.

Each family was visited at intervals of 2 to 4 months for a period long enough to obtain a sickness record for 12 consecutive months.

[2] The 18 States sampled and the number of canvassed families were as follows: California (890), Colorado (386), Connecticut (100), District of Columbia (99), Georgia (544), Illinois (403), Indiana (491), Kansas (301), Massachusetts (287), Michigan (329), Minnesota (224), New York (1,710), Ohio (1,148), Tennessee (212), Virginia (412), Washington (551), West Virginia (318), Wisconsin (290). Further details about the distribution of the canvassed population are included in a preceding paper (*1*).

[3] Every community that was included in the study had either a local health department or some other organization employing a visiting nurse or both; therefore, the most rural areas with no organized community services are not represented.

On the first call a record was made of the number of members of the household, together with sex, age, marital status, occupation, and other facts about each person. On succeeding visits the canvasser recorded all illness that had occurred since the preceding call, with such pertinent facts about each case as the date of onset; whether attended by a doctor and if so the type of each attendant in such terms as private physician, surgeon or other specialist, clinic physician, dentist, chiropodist, osteopath, chiropractor, midwife, or other; number of calls on the case by each practitioner, with separation into home and office for physicians; the total duration of symptoms, of disability, of confinement to bed and to a hospital; and the nature and extent of nursing service. Data about cases that were still sick at the preceding visit were brought up to date and when completed the termination was entered. Thus there are available certain facts about the observed population, the number of illnesses suffered, and the frequency and volume of doctors' services in connection with those illnesses.

Definition of illness as recorded in survey.—An illness, for the purpose of this study, was defined as any symptom, disorder, or affection which persisted for one or more days or for which medical service [4] was received or medicine purchased. Illness included the results of both disease and injury. What was actually recorded as a case, however, was necessarily influenced not only by the informant's (usually the housewife's) conception of illness but also by her memory. With visits as infrequent as 2 to 4 months, it was inevitable that many of the nondisabling illnesses would be terminated and forgotten before the next visit of the enumerator. However, these minor cases would seldom be attended by a doctor. Also the few but long institutional cases which are largely missed in family surveys [5] would not contribute to the usual home and office medical practice in a general noninstitutional population. It is felt, therefore, that doctor's services as recorded in this study are reasonably complete for the general family population.

Definition of doctor's care as recorded in survey.—An illness was considered as attended if any type of practitioner was called in or con-

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[4] Exclusive of dental services, eye refractions, immunizations, and health examinations rendered when no symptoms were present.

[5] The limitations of the house-to-house survey in recording institutional cases was discussed in considerable detail in an earlier paper in this series (*14*).

No special inquiry was made in this study about mental defectives at home or about persons away from the family throughout the year in such resident institutions as hospitals for the insane, mentally defective, or tuberculous; however, a few such cases were recorded. Physical impairments such as blindness and lost and impaired limbs were not included as sickness unless the defect was treated or otherwise involved some status other than the mere presence of an impairment. These various factors made for a minimum of recorded cases that were sick or disabled or in bed or in a hospital throughout the year of the study. While such cases are always rare as compared with short illnesses, they have an important bearing upon the total volume of medical and hospital care because of their long duration.

sulted about the case,[6] including all hospital cases; the analysis, however, separates attendants into different types. Illnesses with two or more diagnoses were counted as attended if a doctor was called in connection with any diagnosis. Nursing services are tabulated separately; nurses are not included in this analysis of attendants who had primary responsibility for cases, even in the few instances where a nurse was the only attendant. However, a midwife who was the only attendant is counted as a primary attendant because she customarily has charge of a case without the supervision of a doctor. Thus the attendant refers to anyone who assumes primary charge of a case and disregards the quality of the service because no index of quality was available.

The analysis separates the services of medical doctors (M. D.) from all other types of attendants; cases attended only by the hospital or clinic staff are counted in the group of medically attended cases. The medically attended group is further subdivided into attendance by private physicians in general practice, by specialists, and by clinic physicians. The recorded services of specialists are a minimum or understatement because the only physicians so tabulated are those designated as specialists by the family informant. This method may miss many who are listed in directories as specialists but it has the virtue that any physician so designated is generally recognized in his community as a specialist.

Classification of causes of illness.—In the present study of 8,758 households by periodic visits, the diagnoses as reported by family informants were submitted to the attending physician for confirmation or correction and his diagnosis substituted for the one reported by the family. While not all cases were attended and reports could not be obtained from all attending physicians, the replies indicated that the housewife usually reported with reasonable accuracy the diagnosis which the physician had given to the family.[7]

Considering an illness in the sense of a continuous period of sickness, only 4.3 percent were designated as due to more than one cause. In general, the more important or more serious cause was assigned as primary, except where a disease like pneumonia is commonly recognized as following measles or influenza, in which case the antecedent condition was taken as primary.[8] In this series of papers, rates per 1,000 population for attended cases and doctors' calls on illness from all causes and from broad disease groups are based on sole or primary

[6] In a few instances the only consultation was by telephone or by some other member of the family going to see the doctor, such cases were counted as attended but no doctor's calls were counted for them If a doctor treated two or more patients on one call to a family, each patient seen was counted as having a call. See footnotes to table 1 for further details.

[7] See comparison of diganoses reported by families and by physicians in the Health Survey of 1935-36 (*18*, table 2).

[8] Further details on the method of classifying the causes of illness are included in the first report in the series (*1*).

diagnoses only. In computing doctors' calls for specific diseases such as pneumonia, appendicitis, and whooping cough, all cases of the given diagnosis are considered whether it was the sole, primary, or contributory cause of the illness.

Methods of tabulating and computing.—In computing attended cases per 1,000 population, illnesses that originated prior to but caused sickness during the study year are included along with cases having their onset within the period of observation; the inclusion of the illnesses with prior onset seemed necessary to give proper representation to chronic ailments. The only date of onset available was the onset of symptoms (nondisabling or disabling); therefore, prior onset does not necessarily mean prior attendance by a doctor. In 7 percent of the attacks of illness onset was prior to the year; this does not mean that in the other 93 percent onset of the disease always occurred within the year, for the patient may have had preceding attacks of the same chronic disease. For all diagnoses commonly considered as chronic, 33 percent were reported with an onset for this illness prior to the study year, as compared with 3 percent for diagnoses ordinarily considered as acute. A large proportion of the cases of such diseases as tuberculosis, cancer, diabetes, and cardio-renal affections originated prior to the study; a preceding paper shows for each diagnosis the number of illnesses with prior onset (*1*).

The doctors' calls refer in all instances to those *within the 12-month study period.* In computing average calls per case, both complete and incomplete cases are included as cases but the calls refer to those within the study year only. The incomplete cases (those with prior onset and those still sick at the last report) usually average considerably longer durations and presumably have more doctors' calls than the complete cases; therefore, average calls per case which excluded cases with prior onset would be biased toward fewer calls. Computation of the annual calls per 1,000 persons includes all calls within the study year, whether the calls pertain to cases that originated within or prior to the year and whether they pertain to cases that had been terminated or were still sick at the last report on the case.[9] Attended cases with an unknown number of calls are put in at the average calls per case of the same diagnosis attended by the same type of practitioner.

In the present paper no distinction is made between hospital and nonhospital cases, the calls per 1,000 persons and the average calls per case referring always to all cases. Seven percent of all cases and 9 percent of attended cases were hospitalized; and of those hospitalized only 5 percent did not receive home, office, or hospital calls from a

[9] A preceding paper (*15*) shows the percentage of cases of different types that were incomplete because of prior onset or because still sick at the last report on the case.

private doctor or clinic physician in addition to care by the hospital staff.[10] A later paper will be devoted to hospital care.

II. EXTENT OF MEDICAL CARE BY DOCTORS AS MEASURED BY VARIOUS TYPES OF RATES

The extent of medical care in a given population group may be measured by several types of rates: (*a*) The percentage of illnesses that were attended by a doctor, (*b*) the cases attended by a doctor per 1,000 population, with separation into those attended in the office only and those with one or more home calls, (*c*) the number of doctors' calls per 1,000 population, with separation into office and home calls, and (*d*) the number of doctors' calls per attended case. One might further classify by type of attendant and compute such rates for each type of practitioner. It may be worth while to summarize for all causes of illness these various medical-care rates for persons of all ages.

Summary of doctors' care[11] *of illness for all ages.*—In the 8,758 families visited at intervals of 2 to 4 months in urban and rural parts of 18 States, 79 percent of all illnesses were attended by one or more types of practitioners. While some of the cases were attended by two types of practitioners (e. g., physician and specialist) and others by two or more doctors of the same type (e. g., family and other physician in general practice), the great majority (90 to 95 percent of the attended cases) were attended by one doctor only. The attended cases during the year amounted to 647 per 1,000 population, with an annual total of 2,949 calls per 1,000 population,[12] or 2.9 calls per person under

[10] Home, office, and hospital calls by private or clinic doctors for hospitalized illness amounted to 8.7 calls per case, as compared with 4.2 calls per case for all attended illnesses. Doctors' calls per hospitalized cases for the specific diagnoses were in nearly every instance larger than the corresponding figure for all attended cases; thus the greater severity of the cases that were hospitalized led to more doctors' calls per case in addition to supplementary care by the hospital staff.

The diagnoses with a high percentage of cases with no care except by the hospital staff were tuberculosis, 16 percent; nervous diseases, 16 percent; bones, joints, malformations, and diseases of early infancy, 15 percent; communicable diseases, 9 percent; and accidents, 9 percent. No other frequent hospital diagnoses were over 6 percent.

[11] To avoid the repeated use of a long expression such as "all types of practitioners," "doctor" is used in this study in the popular sense to designate any type of healer; and "physician" and "specialist" are used to designate persons with medical degrees. For the most part rates are shown separately for the different types of healers.

[12] The rates quoted for the surveyed population throughout this discussion have been adjusted to the age distribution of the white population of the United States in 1930. In other words, the rates are corrected for the fact that the surveyed sample did not have the same age distribution as the general population of the United States. Percentages of cases and of calls quoted in the text are computed from adjusted rates rather than from the actual numbers of cases and calls; similarly, calls per case are computed from the adjusted rates. In no instance are these measures radically different from similar computations based on the actual numbers of cases; both results are shown in table 1.

The rates for doctors' calls as given in this report do not check exactly with those given in the Committee report (*16*) because (*a*) adjustment in that report was made for income but not for age differences, (*b*) in the present study calls are summated from case records, and cases that had medical attendance with an unknown number of calls are assumed to have had the same number of calls as the average for other cases of the same diagnosis attended by the same type of practitioner.

observation (table 1). There was a total of 4.6 calls during the study year per case attended by any practitioner.[13]

Of the total of 647 attended cases per 1,000 population, 526 cases per 1,000 were attended by private physicians not designated as specialists.[14] Of the total attended cases, 81 percent were attended by these private general physicians, and they made 72 percent of all calls by any type of attendant. Of the 526 cases per 1,000 attended by private physicians not designated as specialists, 294 cases per 1,000 had one or more home calls and the other 232 had office calls only. These cases had a total of 2,114 calls per 1,000 population, 1,051 per 1,000 being home calls and the other 1,063 being calls by the patient to the office of the physician. Thus, of the total cases attended by private physicians not designated as specialists, 56 percent had home calls; the other 44 percent of these cases had office calls only; the office calls on these cases plus the office calls on cases that also had home calls amounted to 50 percent of the total calls by private physicians in general practice (table 1).

In this surveyed group there were 80 cases attended by specialists for each 1,000 population, with a total of 400 specialists' calls per 1,000 population. Thus, there were 5.0 calls by specialists per case so attended; the same case may or may not have had the attendance of a general or other practitioner also. Of all cases attended by any type of practitioner, 12.5 percent were attended by a specialist, and 13.6 percent of all practitioners' calls were made by a specialist.

There were 30 public clinic cases per 1,000 population, with a total of 127 clinic calls per 1,000, or 4.3 clinic calls per public clinic case; the clinic cases may or may not have had other attendants also. Only 4.6 percent of all cases attended by any practitioner had the attendance of a public clinic and 4.3 percent of all calls were calls to a public clinic.

Illness attended by private group clinics amounted to 8.0 cases per 1,000 population, with a total of 28 clinic calls per 1,000 or 3.5 calls per private group clinic case.

There were 33 illnesses attended by nonmedical practitioners per 1,000 population,[15] with a total of 279 calls for these practitioners per

[13] No exact comparison can be made with the results of the National Health Survey of 1935–36 (*19*) because that study recorded medical care on cases disabling for 7 consecutive days or longer, while the present study recorded care on cases disabling for 1 day or longer and also on nondisabling cases. However, the large volume of care for short cases is evident from the fact that the Health Survey recorded only 900 physicians' calls on cases disabling for 7 days or longer per 1,000 white persons in 83 cities (*19*), as compared with 2,670 calls (exclusive of nonmedical) per 1,000 population in the present study covering both disabling and nondisabling cases. The Health Survey recorded 7.4 doctors' calls per attended case disabling 7 days or longer, as compared with 4.6 calls per attended case (disabling and nondisabling) in the present study.

[14] The designation of specialist was accepted as given by the family; that is, only those physicians were tabulated as specialists who were so designated by the family informant.

[15] Nonmedical practitioners in table 1 include osteopath, chiropractor, Christian Science and other faith healers, naturopath, midwife, and chiropodist (but not dentist). Data for some of these types are shown separately in later tables.

1,000 population, or 8.5 calls per case so attended. Thus, 5.1 percent of all cases attended by any practitioner had the attendance of a non-medical practitioner (with or without other attendants), but 9.5 percent of all calls were made by these nonmedical practitioners (table 1).

TABLE 1.—*Frequency and volume of services by physicians and other practitioners in connection with illness*[1] *among persons of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

Sex and type of rate	All ages[2]		Age									
	Adjusted[3]	Crude	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
Illness attended by any practitioner:												
Cases attended by any practitioner per 1,000 population:												
Both sexes, all causes	647	663	955	706	480	443	567	690	634	613	647	760
Male, all causes	559	597	988	725	484	422	358	502	499	501	566	645
Female, all causes	724	727	925	686	476	464	719	830	770	750	744	848
Female, all except genital and puerperal	645	651	923	685	472	422	517	609	648	704	731	841
Calls by any practitioner per 1,000 population:												
Both sexes, all causes	2,949	2,785	2,624	2,201	1,709	1,819	2,915	3,419	3,247	3,279	3,530	5,371
Male, all causes	2,410	2,349	2,658	2,338	1,710	1,772	1,809	2,144	2,501	2,560	3,230	4,325
Female, all causes	3,423	3,206	2,594	2,068	1,708	1,866	3,678	4,366	4,001	4,159	3,891	6,185
Female, all except genital and puerperal	2,815	2,624	2,585	2,063	1,690	1,643	2,211	2,596	3,063	3,790	3,810	6,061
Percent of total cases that were attended by any practitioner:												
Both sexes, all causes	78.6	78.1	78.8	72.1	70.6	73.9	84.3	84.1	81.9	80.6	76.6	77.6
Male, all causes	77.6	77.3	79.7	72.5	70.7	75.2	78.8	82.2	80.9	80.2	78.3	75.8
Female, all causes	79.1	78.7	77.9	71.7	70.5	72.8	86.5	85.0	82.7	81.1	75.1	78.7
Female, all except genital and puerperal	77.4	77.0	77.9	71.7	70.6	71.7	82.6	81.1	80.4	80.2	74.8	78.7
Practitioners' calls per case attended:												
Both sexes, all causes	4.56	4.20	2.75	3.12	3.56	4.10	5.14	4.96	5.12	5.35	5.46	7.07
Male, all causes	4.31	3.93	2.69	3.22	3.53	4.20	5.22	4.27	5.01	5.11	5.71	6.70
Female, all causes	4.73	4.41	2.80	3.01	3.59	4.02	5.11	5.26	5.19	5.55	5.23	7.29
Female, all except genital and puerperal	4.37	4.03	2.80	3.01	3.58	3.89	4.28	4.26	4.73	5.38	5.21	7.20

[1] Illnesses refer to periods of sickness regardless of the number of diagnosis; that is, these totals for all causes are the sums of data for cases with sole or primary diagnosis. Cases refer to those that lasted for 1 or more days (disabling and nondisabling) including those with prior onset that extended into the study year and those still sick at the last visit; cases with prior onset are counted as attended even when all calls were prior to the study year (only 0.4 percent of the cases were so recorded). If an illness had two types of attendant, it was counted for both attendants but there is no duplication of calls; the total cases attended by any practitioner counts each case only once. A few attended cases were counted as having no calls because all service was rendered within a hospital by the hospital staff. Calls refer to those within the study year only, including those by private physicians upon patients in hospitals. In computing total calls, cases with an unknown number of calls were put in at an average based on cases of the same diagnosis group with known numbers of calls, exclusive of the few cases with 100 or more calls. Services of dentists were not recorded in terms of calls and no estimate for calls was put into this table for the few *illnesses* (about 1 percent) attended by dentists; cases, however, are included. For dental services for the well and the sick in this group of families, see preceding paper (*13*).

Illness from accident is included along with that due to disease.

[2] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

[3] Rates in the form of cases or calls per 1,000 population are adjusted by the direct method to the age distribution of the white population of the death registration States in 1930 as a standard population; this population is given for specific ages in table 1 of a preceding paper (*4*). The adjustment method involves the weighting of the age specific rates for the canvassed population according to the age distribution of the standard population. The details of the process are given under the heading of "corrected death rates" in Pearl (*17*), pp. 269–271.

Figures in the "adjusted" column on calls per case represent the result of dividing the adjusted rate for calls per 1,000 by the adjusted rate for cases per 1,000; figures in the "adjusted" column for percentage of cases or percentage of calls represent the percentage that one adjusted rate per 1,000 is of another adjusted rate per 1,000.

TABLE 1.—*Frequency and volume of services by physicians and other practitioners in connection with illness among persons of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*—Continued

Sex and type of rate	All ages		Age									
	Adjusted	Crude	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
Illness attended by private physicians not designated as specialists: [4]												
Cases attended by private physicians per 1,000 population:												
Both sexes, all causes	526	537	776	572	379	361	473	570	499	491	522	660
Male, all causes	458	487	809	590	387	351	298	417	394	405	473	556
Female, all causes	585	586	745	554	371	372	602	683	605	596	581	742
Female, all except genital and puerperal	518	522	744	553	367	335	429	497	502	557	571	734
Cases with home calls per 1,000 population:												
Both sexes, all causes	294	307	533	368	202	168	247	300	242	240	274	456
Male, all causes	238	265	551	369	205	153	128	177	164	190	218	339
Female, all causes	343	348	516	368	199	183	335	391	321	302	341	547
Female, all except genital and puerperal	298	305	516	368	198	160	217	263	253	280	335	542
Cases with office calls only per 1,000 population:												
Both sexes, all causes	232	230	243	204	177	193	226	270	257	251	248	204
Male, all causes	220	222	258	221	182	198	170	240	230	215	255	217
Female, all causes	242	238	229	186	172	189	267	292	284	294	240	195
Female, all except genital and puerperal	220	217	228	185	169	175	212	234	249	277	236	192
Total calls by physicians per 1,000 population:												
Both sexes, all causes	2,114	1,984	1,969	1,639	1,197	1,305	2,174	2,426	2,118	2,263	2,424	4,416
Male, all causes	1,766	1,711	2,024	1,794	1,294	1,319	1,398	1,480	1,683	1,721	2,388	3,645
Female, all causes	2,412	2,248	1,920	1,488	1,099	1,291	2,740	3,128	2,556	2,928	2,468	5,016
Female, all except genital and puerperal	1,944	1,800	1,916	1,487	1,080	1,092	1,593	1,772	1,853	2,627	2,407	4,941
Home calls by physicians per 1,000 population:												
Both sexes, all causes	1,051	1,001	1,335	1,029	604	562	801	1,038	880	946	1,062	3,178
Male, all causes	818	832	1,388	1,121	650	532	393	510	583	624	1,047	2,256
Female, all causes	1,249	1,163	1,285	940	557	592	1,100	1,431	1,180	1,341	1,081	3,897
Female, all except genital and puerperal	1,042	965	1,283	939	556	502	606	843	840	1,210	1,052	3,872
Office calls by physicians per 1,000 population:												
Both sexes, all causes	1,063	983	634	610	593	743	1,373	1,388	1,238	1,317	1,362	1,238
Male, all causes	948	879	636	673	644	787	1,005	970	1,100	1,097	1,341	1,359
Female, all causes	1,163	1,085	635	548	542	699	1,640	1,697	1,376	1,587	1,387	1,119
Female, all except genital and puerperal	902	835	633	548	521	590	987	929	1,013	1,417	1,355	1,069
Home calls by physicians per case with home calls:												
Both sexes, all causes	3.57	3.26	2.51	2.79	2.99	3.35	3.24	3.46	3.64	3.94	3.88	6.97
Male, all causes	3.44	3.14	2.52	3.04	3.17	3.47	3.08	2.88	3.56	3.29	4.81	6.66
Female, all causes	3.64	3.35	2.49	2.55	2.80	3.24	3.29	3.66	3.67	4.44	3.17	7.12
Female, all except genital and puerperal	3.49	3.17	2.49	2.50	2.81	3.14	2.79	3.21	3.32	4.32	3.14	7.14
Percent of cases attended by physicians that had home calls:												
Both sexes, all causes	55.9	57.1	68.7	64.4	53.2	46.5	52.2	52.6	48.5	48.9	52.4	69.0
Male, all causes	52.0	54.4	68.1	62.5	52.9	43.7	42.9	42.5	41.6	46.8	46.1	60.9
Female, all causes	58.6	59.3	69.3	66.4	53.6	49.1	55.6	57.2	53.1	50.7	58.6	73.8
Female, all except genital and puerperal	57.6	58.4	69.3	66.5	53.8	47.7	50.6	53.0	50.4	50.3	58.6	73.8
Percent of cases attended by physicians that had office calls only:												
Both sexes, all causes	44.1	42.9	31.3	35.6	46.8	53.5	47.8	47.4	51.5	51.1	47.6	31.0
Male, all causes	48.0	45.6	31.9	37.5	47.1	56.3	57.1	57.5	58.4	53.2	53.9	39.1
Female, all causes	41.4	40.7	30.7	33.6	46.4	50.9	44.4	42.8	46.9	49.3	41.4	26.2
Female, all except genital and puerperal	42.4	41.6	30.7	33.5	46.2	52.3	49.4	47.0	49.6	49.7	41.4	26.2

[4] "Specialists" as used in this study refers to physicians so designated by family informants, regardless of listing in any directory of physicians.

TABLE 1.—*Frequency and volume of services by physicians and other practitioners in connection with illness among persons of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*—Continued.

Sex and type of rate	All ages: Adjusted	All ages: Crude	Age: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
Illness attended by private physicians not designated as specialists—Continued.												
Percent of physicians' calls that were home calls:												
Both sexes, all causes	49.7	50.4	67.8	62.8	50.4	43.1	36.9	42.8	41.6	41.8	43.8	72.0
Male, all causes	46.3	48.6	68.6	62.5	50.2	40.3	28.1	34.4	34.7	36.3	43.9	61.9
Female, all causes	51.8	51.8	66.9	63.1	50.7	45.9	40.1	45.7	46.2	45.8	43.8	77.7
Female, all except genital and puerperal	53.6	53.6	67.0	63.2	51.5	45.9	38.0	47.6	45.3	46.1	43.7	78.3
Percent of physicians' calls that were office calls:												
Both sexes, all causes	50.3	49.6	32.2	37.2	49.6	56.9	63.1	57.2	58.4	58.2	56.2	28.0
Male, all causes	53.7	51.4	31.4	37.5	49.8	59.7	71.9	65.6	65.3	63.7	56.1	38.1
Female, all causes	48.2	48.2	33.1	36.9	49.3	54.1	59.9	54.3	53.8	54.2	56.2	22.3
Female, all except genital and puerperal	46.4	46.4	33.0	36.8	48.5	54.1	62.0	52.4	54.7	53.9	56.3	21.7
Percent of all attended cases that were attended by physicians not designated as specialists:												
Both sexes, all causes	81.4	81.0	81.2	81.0	79.1	81.5	83.5	82.6	78.7	80.1	80.7	86.9
Male, all causes	81.9	81.5	81.9	81.4	80.1	83.1	83.1	83.1	79.0	80.9	83.5	86.2
Female, all causes	80.8	80.6	80.5	80.7	78.1	80.1	83.7	82.4	78.5	79.5	78.1	87.4
Female, all except genital and puerperal	80.3	80.1	80.6	80.7	77.9	79.3	83.1	81.6	77.5	79.1	78.1	87.3
Percent of all practitioners' calls that were calls by physicians not designated as specialists:												
Both sexes, all causes	71.7	71.2	75.1	74.5	70.1	71.7	74.6	71.0	65.2	69.0	68.7	82.2
Male, all causes	73.3	72.9	76.2	76.7	75.7	74.4	74.8	69.1	67.3	67.2	73.9	84.3
Female, all causes	70.5	70.1	74.0	72.0	64.3	69.2	74.5	71.7	63.9	70.4	63.4	81.1
Female, all except genital and puerperal	69.1	68.6	74.1	72.1	63.9	66.5	72.1	68.3	60.5	69.3	63.2	81.5
Illness attended by specialists:[4]												
Cases attended by specialists per 1,000 population:												
Both sexes, all causes	80.5	85.1	135.9	90.3	56.7	55.1	66.1	89.9	83.5	71.9	75.4	69.1
Male, all causes	72.6	79.3	141.7	94.0	59.5	53.7	51.5	64.1	71.8	60.7	65.9	66.4
Female, all causes	87.4	90.6	129.7	86.7	53.8	56.5	76.7	109.0	95.2	85.7	86.7	71.3
Female, all except genital and puerperal	77.7	81.1	128.9	86.7	53.8	56.5	62.0	80.0	75.2	79.7	82.2	69.5
Calls by specialists per 1,000 population:												
Both sexes, all causes	400	398	414	336	260	264	341	513	485	305	470	443
Male, all causes	340	343	419	315	251	219	286	323	360	400	443	412
Female, all causes	451	452	407	356	270	308	381	655	602	389	504	467
Female, all except genital and puerperal	388	388	406	356	270	308	307	424	484	361	481	460
Specialists' calls per case attended by specialist:												
Both sexes, all causes	4.97	4.68	3.05	3.72	4.59	4.79	5.16	5.71	5.81	5.49	6.24	6.41
Male, all causes	4.68	4.32	2.96	3.35	4.22	4.09	5.57	5.03	5.14	6.59	6.72	6.21
Female, all causes	5.16	4.98	3.14	4.11	5.01	5.45	4.97	6.01	6.32	4.54	5.81	6.55
Female, all except genital and puerperal	4.99	4.78	3.15	4.11	5.01	5.45	4.95	5.30	6.43	4.53	5.89	6.62
Percent of all attended cases that were attended by specialists:												
Both sexes, all causes	12.5	12.8	14.2	12.8	11.8	12.4	11.7	13.0	13.2	11.7	11.7	9.1
Male, all causes	13.0	13.3	14.3	13.0	12.3	12.7	14.4	12.8	14.4	12.1	11.7	10.3
Female, all causes	12.1	12.5	14.0	12.6	11.3	12.2	10.7	13.1	12.4	11.4	11.7	8.4
Female, all except genital and puerperal	12.1	12.5	14.0	12.7	11.4	13.4	12.0	13.1	11.6	11.3	11.3	8.3
Percent of all practitioners' calls that were specialists' calls:												
Both sexes, all causes	13.6	14.3	15.8	15.3	15.2	14.5	11.7	15.0	14.9	12.1	13.3	8.2
Male, all causes	14.1	14.6	15.8	13.5	14.7	12.4	15.3	15.1	14.8	15.6	13.7	9.5
Female, all causes	13.2	14.1	15.7	17.2	15.8	16.5	10.4	15.0	15.1	9.4	12.9	7.6
Female, all except genital and puerperal	13.8	14.8	15.7	17.3	15.9	18.7	13.9	16.3	15.8	9.5	12.7	7.6

[4] "Specialists" as used in this study refers to physicians so designated by family informants, regardless of listing in any directory of physicians.

TABLE 1.—*Frequency and volume of services by physicians and other practitioners in connection with illness among persons of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*—Continued

Sex and type of rate	All ages: Adjusted	All ages: Crude	Age: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
Illness attended by public clinics:												
Public clinic cases per 1,000 population:												
Both sexes, all causes	29.5	31.8	43.0	42.9	38.1	18.4	32.5	29.6	26.5	19.4	21.1	21.1
Male, all causes	22.3	25.1	37.3	41.5	34.3	18.3	13.4	17.1	16.5	12.0	13.7	22.8
Female, all causes	36.2	38.2	48.8	44.2	42.0	18.4	46.5	38.9	36.6	28.5	29.9	19.6
Female, except genital and puerperal	29.5	31.8	48.4	43.5	42.0	15.8	21.2	22.2	26.1	27.2	29.9	19.6
Public clinic calls per 1,000 population:												
Both sexes, all causes	127	130	138	127	138	87	191	157	152	77	69	84
Male, all causes	94	96	124	115	95	92	115	148	66	35	41	92
Female, all causes	159	163	153	139	183	81	247	164	238	129	102	78
Female, all except genital and puerperal	123	129	149	135	183	70	98	80	179	124	102	78
Public clinic calls per case attended by public clinics:												
Both sexes, all causes	4.30	4.10	3.22	2.96	3.63	4.71	5.87	5.31	5.73	3.97	3.26	4.00
Male, all causes	4.23	3.84	3.32	2.76	2.76	5.00	8.58	8.66	4.02	2.91	3.00	4.00
Female, all causes	4.39	4.26	3.13	3.13	4.36	4.43	5.30	4.21	6.50	4.51	3.40	4.00
Female, all except genital and puerperal	4.16	4.04	3.08	3.10	4.36	4.42	4.62	3.60	6.86	4.56	3.40	4.00
Percent of all attended cases that were public clinic cases:												
Both sexes, all causes	4.6	4.8	4.5	6.1	7.9	4.1	5.7	4.3	4.2	3.2	3.3	2.8
Male, all causes	4.0	4.2	3.8	5.7	7.1	4.3	3.7	3.4	3.3	2.4	2.4	3.5
Female, all causes	5.0	5.3	5.3	6.4	8.8	4.0	6.5	4.7	4.7	3.8	4.0	2.3
Female, all except genital and puerperal	4.6	4.9	5.3	6.3	8.9	3.7	4.1	3.7	4.0	3.9	4.1	2.3
Percent of all practitioners' calls that were public clinic calls:												
Both sexes, all causes	4.3	4.7	5.3	5.7	8.1	4.8	6.6	4.6	4.7	2.3	1.9	1.6
Male, all causes	3.9	4.1	4.7	4.9	5.5	5.2	6.2	6.9	2.6	1.3	1.3	2.1
Female, all causes	4.7	5.1	5.9	6.7	10.7	4.4	6.7	3.8	5.9	3.1	2.6	1.3
Female, all except genital and puerperal	4.4	4.9	5.8	6.5	10.8	4.2	4.4	3.1	5.8	3.3	2.7	1.3
Illness attended by private group clinics:												
Private group clinic cases per 1,000 population:												
Both sexes, all causes	8.0	8.5	12.7	8.9	6.3	5.9	3.8	10.1	9.9	5.7	5.4	8.0
Male, all causes	7.3	7.8	11.7	7.5	4.8	3.3	3.4	8.7	10.4	8.1	5.0	6.9
Female, all causes	8.5	9.2	13.8	10.4	7.9	8.5	4.1	11.1	9.5	2.7	6.0	8.9
Female, all except genital and puerperal	7.6	8.3	13.8	10.4	7.9	8.5	4.1	6.5	8.5	2.7	6.0	8.9
Private group clinic calls per 1,000 population:												
Both sexes, all causes	28.1	30.0	38.5	27.5	23.0	26.6	10.9	35.6	45.2	18.8	19.7	14.0
Male, all causes	24.8	26.6	37.7	26.6	10.4	17.7	15.7	25.4	46.7	21.1	14.9	13.7
Female, all causes	31.1	33.3	39.5	28.3	37.1	35.5	7.3	43.2	43.7	15.9	25.4	14.3
Female, all except genital and puerperal	25.1	26.8	39.5	28.3	37.1	35.5	7.3	12.7	34.2	15.9	25.4	14.3
Illness attended by nonmedical practitioners [5]												
Cases attended by nonmedical practitioners per 1,000 population:												
Both sexes, all causes	32.9	28.8	7.3	10.5	10.3	19.7	27.8	36.3	48.6	61.5	61.1	43.1
Male, all causes	23.7	21.8	7.5	11.7	10.0	15.1	13.4	25.8	36.3	45.0	39.8	25.2
Female, all causes	42.0	35.6	7.1	9.3	10.6	24.3	38.4	44.2	61.0	81.7	86.7	57.0
Female, all except genital and puerperal	38.6	32.6	7.1	9.3	10.6	21.0	28.6	30.7	57.6	77.0	86.7	55.3
Calls by nonmedical practitioners per 1,000 population:												
Both sexes, all causes	279	243	63	72	89	137	198	287	448	525	547	414
Male, all causes	185	172	52	88	59	124	54	168	336	384	343	163
Female, all causes	369	311	75	56	120	150	303	375	561	697	792	610
Female, all except genital and puerperal	336	281	75	56	120	138	206	307	513	662	792	567

[5] Nonmedical includes osteopath, chiropractor, Christian Science practitioner, faith healer, naturopath, midwife, chiropodist, and others who are not usually graduates of medical schools, except that in this table dentists are not included as nonmedical.

TABLE 1.—*Frequency and volume of services by physicians and other practitioners in connection with illness among persons of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*—Continued

Sex and type of rate	All ages		Age									
	Adjusted	Crude	Under 5 mmm	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
Illness attended by nonmedical practitioners—Continued.												
Nonmedical calls per case attended by nonmedical practitioners:												
Both sexes, all causes	8.47	8.42	8.73	6.87	8.70	6.98	7.10	7.89	9.22	8.53	8.96	9.60
Male, all causes	7.80	7.89	7.00	7.55	5.91	8.26	4.00	6.50	9.27	8.53	8.63	6.45
Female, all causes	8.79	8.72	10.63	6.04	11.37	6.19	7.89	8.50	9.19	8.54	9.14	10 69
Female, all except genital and puerperal	8.70	8.63	10.63	6.04	11.37	6.56	7.20	8.36	8.90	8 59	9.14	10.26
Percent of all attended cases that were attended by nonmedical practitioners:												
Both sexes, all causes	5.1	4.3	.8	1.5	2.1	4 4	4.9	5.3	7.7	10.0	9.4	5.7
Male, all causes	4.2	3.7	.8	1.6	2.1	3.6	3.7	5.1	7 3	9.0	7.0	3.9
Female, all causes	5.8	4.9	.8	1.4	2.2	5.2	5.3	5.3	7.9	10 9	11.7	6.7
Female, all except genital and puerperal	6.0	5.0	.8	1.4	2.3	5.0	5.5	6.0	8.9	10.9	11.9	6.6
Percent of all practitioners' calls that were calls by nonmedical practitioners:												
Both sexes, all causes	9.5	8.7	2.4	3.3	5.2	7.5	6.8	8.4	13 8	16 0	15 5	7.7
Male, all causes	7.7	7.3	2.0	3.8	3.5	7.0	2.9	7.8	13.4	15.0	10 6	3.8
Female, all causes	10.8	9.7	2.9	2.7	7.1	8.1	8.2	8.6	14.0	16.8	20.4	9 9
Female, all except genital and puerperal	11.9	10.7	2.9	2.7	7.1	8 4	9.3	11.8	16.7	17.5	20.8	9.3
Population (years of life):												
Both sexes	------	38,544	5,513	5,715	4,568	3,050	2,119	5,640	5,930	3,351	1,473	998
Male	------	18,896	2,808	2,820	2,301	1,527	894	2,402	2,979	1,845	804	437
Female	------	19,627	2,684	2,895	2,267	1,523	1,225	3,238	2,951	1,506	669	561

Age and sex differences in rates of medical care.—The frequency and volume of medical care varies with age and sex for at least three reasons: (*a*) The amount of illness varies with age and sex; although not all cases are attended and the number of calls per case varies, the attended cases and the calls per 1,000 persons definitely reflect the frequency of illness. (*b*) The diseases that occur most frequently in one age group are not the same as those that are most frequent at other ages, and the different diseases require varying amounts of medical care. (*c*) The severity of a given disease varies with age and so requires varying amounts of medical care. Figures 1 and 2 and table 1 show for males and females of different ages attended cases and doctors' calls per 1,000 population; rates for the various types of practitioners are shown separately. Because puerperal conditions and female genital diseases require considerable medical care that is not needed by men, the rates for females are shown as a total for all causes, and for causes other than female genital and puerperal diagnoses.

No detailed discussion of these charts is needed, but certain characteristics of the curves (figs. 1 and 2) may be pointed out. In a way, the number of doctors' calls measures the severity of a case in much

the same manner as the number of days disabled or in bed. Thus, here, as in the duration of illness (*14*), there is a larger increase for the older ages in the number of doctors' calls per 1,000 population than in the number of attended cases. There is some increase in the older ages in the incidence of home-attended cases, but the greatest increase occurs in home calls per 1,000. Office calls, on the other hand, show little or no increase in the oldest ages. Also, in the youngest ages, the high rate that occurs for home calls among children under 5 years is entirely missing in the curve for office calls.

Specialists' cases (fig. 2), like other physicians' cases, are high for children and for women of the childbearing ages. The percentage of attended cases that had a specialist does not vary greatly with age; however, there is some decline as age increases in both the percentage of cases attended by specialists and of calls made by specialists. Public clinic cases are likewise more frequent in childhood and at the childbearing ages.

The age curves of attendance by nonmedical practitioners vary greatly from those for physicians, specialists, and public clinics. Nonmedical practice is at a minimum among children of both sexes, but at about 20 years the rates per 1,000 females for cases and calls by these practitioners begin a definite rise with a peak at 55–64 years and a decline thereafter. Cases attended by nonmedical practitioners are fewer among males and the peak is reached in the age group 45–54 years, with declining rates thereafter. As measured by the percentage of all attended cases and the percentage of total calls made by the nonmedical practitioners, the showing with respect to males and females is approximately the same.

The various age curves in figures 1 and 2 usually show little difference between the sexes in childhood. At about 20 years the curves of attended cases and also of calls per 1,000 population definitely diverge for males and females, with an excess for females throughout the adult ages. These higher rates for women reflect an excess in total illness rather than in the proportion of cases attended or in doctors' calls per case; the curves in the upper right corner of figure 1 for calls per attended case show little difference between the sexes at any age. The nature of the excess in illness among women was discussed in some detail in a preceding paper (*14*) and need not be repeated here. Considering cases of all ages attended by any practitioner the rate (adjusted for age) for males was 559 per 1,000 as compared with 724 for all causes among females and 645 for all except female genital and puerperal diagnoses, an excess of 15 percent for comparable diagnoses. This excess in attended cases is about the same as the corresponding excesses of 16 percent for all cases, 9 percent for disabling cases, and 19 percent for bed cases, including both attended and nonattended (*14*). Of the total cases among men, 78 percent

were attended by some practitioner, as compared with 79 percent for all cases among females and 77 percent for all except female genital and puerperal diagnoses. Table 1 shows by age and sex the percentage of all cases that were attended by some practitioner.

Considering cases attended at home and home calls per 1,000 persons (fig. 1), the relative excess for women is slightly greater. The

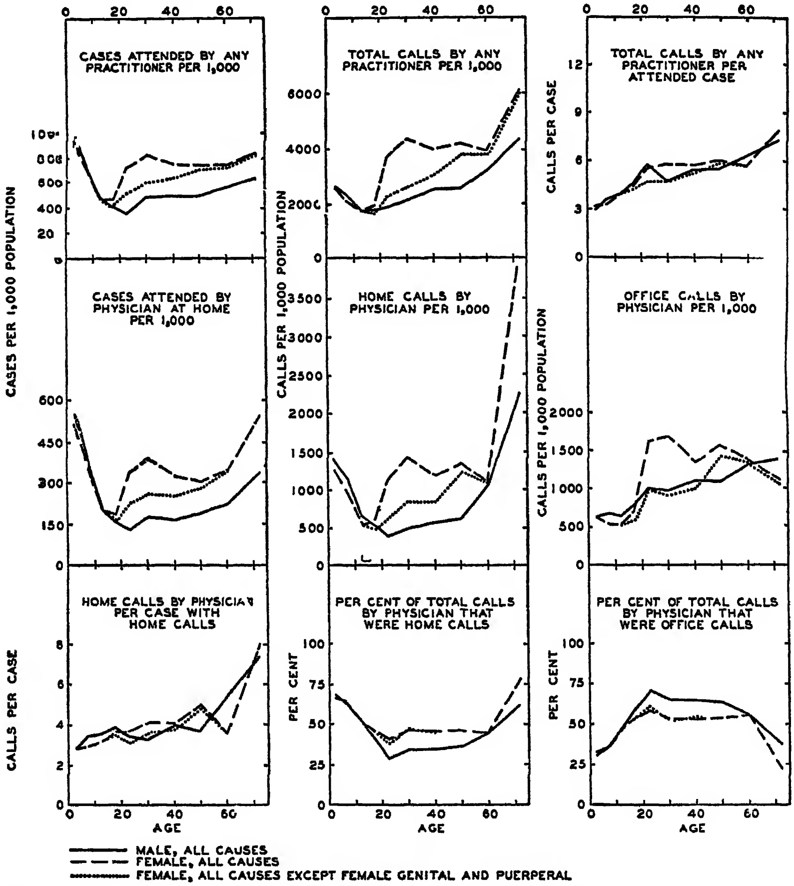

FIGURE 1.—Annual volume of medical care for illness from all causes as measured by various types of rates for males and females of specific ages—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Scales are so made that the adjusted rate for all ages of both sexes represents an interval on the vertical rate scale that corresponds to 30 years on the horizontal age scale.)

home calls per case that had home calls is about the same for males and females of corresponding ages, but the percentage of total calls by these doctors that were home calls is slightly greater for women than men. The small excess for women is not accounted for by female genital and puerperal conditions; the percentage of home calls for women was about the same for all cases and for cases exclusive of these diagnoses.

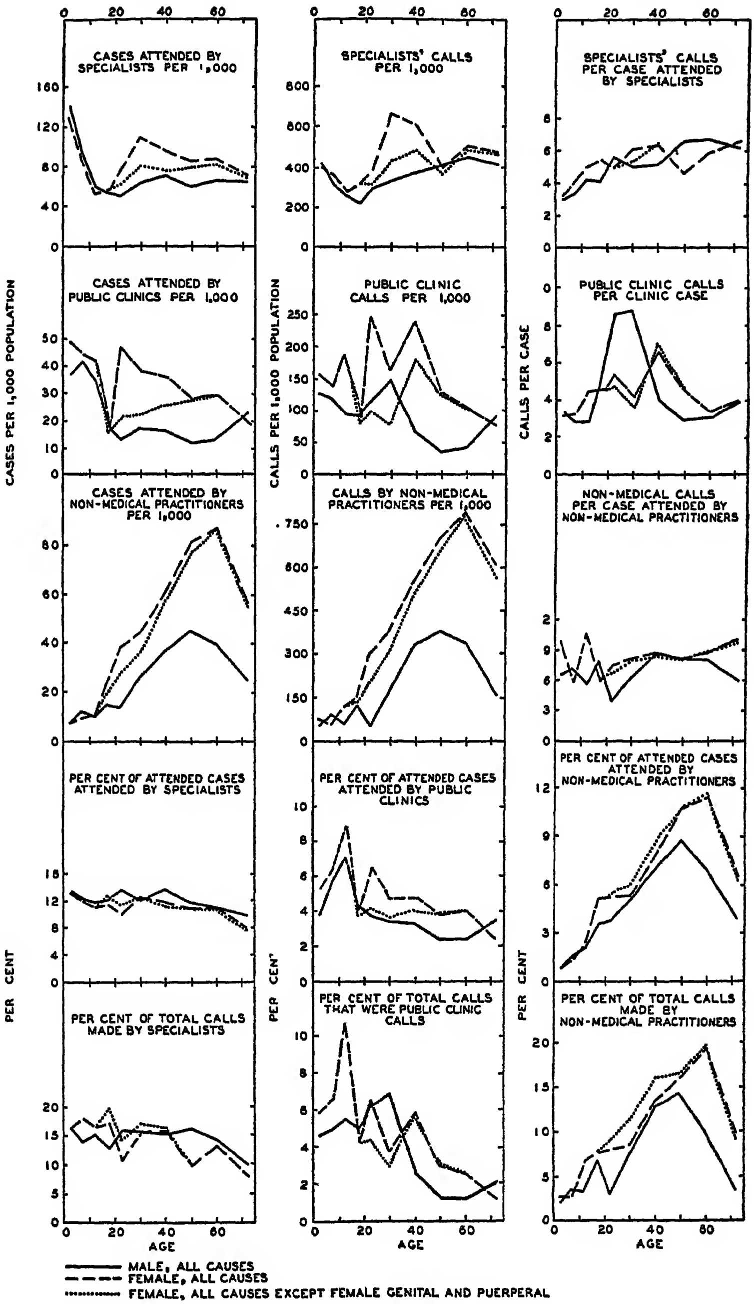

FIGURE 2.—Annual volume of medical care for illness from all causes as measured by various types of rates for males and females of specific ages (continued).

It may be worth noting that cases attended at home and home calls per 1,000 persons (fig. 1) are very slightly but consistently higher for boys under 15 years than for girls of those ages. This excess for boys is true for cases attended by specialists per 1,000 persons, but it is not true for specialists' calls per 1,000. Public clinic cases and calls seem to be more frequent for girls than boys under 15 years. However, there is little difference between boys and girls under 15 years with respect to the total attended cases and the total calls by any practitioner per 1,000.

Attended cases and calls by specialists show an excess for females, but the excess is not large when genital and puerperal diagnoses are eliminated. The percentages of cases and of calls by specialists are about the same for men and women under 40 years but above that age they may be slightly greater for men (fig. 2). For persons of all ages, cases attended by specialists amounted to 73 per 1,000 males as compared with rates for females of 87 for all causes and 78 for all except female genital and puerperal diagnoses, an excess of 7 percent for comparable diagnoses. Specialists' calls amounted to 340 per 1,000 males as compared with rates for females of 451 for all causes and 388 for all except genital and puerperal diagnoses, an excess of 14 percent for females. The excesses for women in these rates for specialists represent excesses in illness rather than in the attendance of a specialist; among men 13 percent of all attended cases had a specialist, as compared with 12 percent for women for all causes and the same figure for all except genital and puerperal diagnoses. Of the total calls by any practitioner, 14 percent of those for males were made by a specialist as compared with percentages for women of 13 for all causes and 14 for all except genital and puerperal diagnoses (table 1).

Similarly, there is an excess for females over males in cases attended by public clinics. There were 22 public clinic cases per 1,000 males as compared with rates for females of 36 for all causes and 30 for all except genital and puerperal diagnoses, an excess of 36 percent for comparable diagnoses. Public clinic calls amounted to 94 per 1,000 males as compared with rates for females of 159 for all causes and 123 for all except female genital and puerperal diagnoses, an excess of 31 percent for comparable diagnoses. Public clinic calls per public clinic case amounted to 4.2 for males as compared with averages for females of 4.4 for all cases and 4.2 for cases exclusive of female genital and puerperal diagnoses. Of the total attended illnesses for males, 4.0 percent were public clinic cases as compared with percentages for females of 5.0 for all cases and 4.6 for all except female genital and puerperal diagnoses. Public clinic calls for males amounted to 3.9 percent of all calls as compared with percentages for females of 4.7 for all causes and 4.4 for all except female genital and puerperal diagnoses.

The large increase in cases and calls by nonmedical practitioners [16] in the adult and middle ages has already been noted. Considering the curves for the two sexes separately (fig. 2), the increase during the middle ages in the use of this type of practitioner is much greater among women then men. For all age groups above 20 years there is a large excess for women over men in nonmedically attended cases and nonmedical calls, only a small part of which is accounted for by female genital and puerperal diagnoses. Midwives are about the only persons included in the nonmedical group who commonly attend confinements, and the number of these cases attended by midwives was small in the surveyed group. Considering all ages, all cases attended by nonmedical practitioners amounted to 24 per 1,000 males as compared with rates for females of 42 for all causes and 39 for all except female genital and puerperal diagnoses, an excess of 62 percent for comparable diagnoses. Calls by nonmedical practitioners amounted to 185 per 1,000 males as compared with rates for females of 369 for all causes and 336 per 1,000 for all except female genital and puerperal, an excess of 82 percent for comparable diagnoses. Calls per case were somewhat higher for women than men, 7.8 for men as compared with averages for women of 8.8 for all causes and 8.7 for all except female genital and puerperal diagnoses.

III. VARIATION IN VOLUME OF MEDICAL CARE WITH SIZE OF CITY, GEOGRAPHIC SECTION, AND INCOME

Rates that have been given above refer to the whole surveyed group of families. As might be expected, certain classifications of the population have rates that vary considerably from the averages for the whole group.

Size of city and volume of medical care.—Cities and towns were tabulated in three classes to compare the volume of medical care:[17] (*a*) Cities of 100,000 or more population, (*b*) cities of 5,000 to 100,000 population, and (*c*) towns under 5,000 and rural areas. For several reasons given in notes to table 2 these tabulations as well as those in the Committee report (*16*) are not strictly comparable with other tables in this paper, but they give an accurate comparison of the variation with size of city and geographic area. In calls by any practitioner on account of illness, the rate per 1,000 population in cities over 100,000 was 34 percent higher than that for towns under

[16] Nonmedical practitioners here include osteopath, chiropractor, Christian Science and other faith healers, naturopath, midwife, and chiropodist (but not dentist).

[17] The data here reviewed on the volume of medical care by size of city and geographic section are based largely on unpublished tabulations for this group of families which were made under the direction of G. St. J. Perrott and I. S. Falk to supplement in this respect the report of the Committee on the Costs of Medical Care (*16*).

5,000 and rural areas, with the rate for cities of 5,000–100,000 population falling logically between the two extremes. The excess in doctors' calls in the large cities represents a higher percentage of attended cases and more calls per case rather than more illness; illness rates per 1,000 were not greatly different in the three city-size classes (table 2).

TABLE 2.—*Services of physicians and other practitioners in connection with illness in cities of different sizes—7,434 canvassed white families in 14 States,[1] 1928–31*

Type of rate	All city sizes[1] (simple means of rates in the three sizes)	Cities of 100,000 or over	Cities 5,000–100,000	Towns under 5,000 and rural areas
		Annual rates per 1,000 population[2]		
Total illnesses[3] per 1,000 population	830	795	846	850
Calls[4] per 1,000 population:				
Calls by any practitioner	2,641	3,003	2,679	2,240
Calls by all private physicians and specialists	2,134	2,420	2,233	1,750
Home calls by private general physicians	1,063	1,192	1,163	829
Clinic calls[4]	311	362	245	325
Calls by nonmedical practitioners	196	221	201	165
Calls by all practitioners per total case	3.18	3.78	3.17	2.64
Population under observation	32,686	11,593	8,550	12,543

[1] The families in Massachusetts, Connecticut, Colorado, and Washington State are not included because this table is a summary of the same tabulation made for table 3.
[2] These rates are not comparable with others in this paper (except table 3) because (*a*) they are built up from individual summary cards without allowance for occasional cases with an unknown number of calls, (*b*) they are not adjusted for age, (*c*) they are not based on all of the canvassed families, and (*d*) the rates for cities of all sizes are simple means of the rates in the 3 city-size classes.
[3] All illness, both attended and not attended by doctors.
[4] Calls in connection with illness except that clinic care includes also calls for immunization, well-baby care, and health (including school) examination.

Both total and home calls by private physicians (M. D.) per 1,000 population show roughly the same relative excess in large cities over small towns and rural areas, 38 and 44 percent, respectively. Clinic calls per 1,000 population (including services to the well and to the sick) show only 11 percent excess for large cities over towns and rural areas, with fewer calls in cities of 5,000–100,000 than in small towns. Ordinarily one might expect more clinic service in large cities, but all communities sampled for this study had a health department or a visiting nurse or both, so that the most rural communities with the least public service were not included. Therefore, the city-rural results for clinic calls in this study are probably atypical.

Calls per 1,000 population by such nonmedical practitioners as osteopaths, chiropractors, and faith healers were 34 percent higher in large cities than in small towns and rural areas, with cities of 5,000–100,000 falling between the two extremes.

Geographic section and volume of medical care.—The great majority of the families surveyed in the Northeast were in New York State, so in this paper the data for that State are used instead of the Northeast. In the West, California supplied a considerable share of the

schedules and probably represents conditions that vary from those in Colorado and Washington, the other western States sampled in the survey. Therefore, the geographic sections considered in this study are: (*a*) New York State, (*b*) North Central, (*c*) South, (*d*) California. States included in each section are given in footnotes to table 3. The urban-rural distribution of the surveyed families differed greatly in these areas and the variation was not typical of the situation in the whole State or section; therefore, the data in table 3 consist of simple averages of rates for three city-size classes [18] for each geographic section.

TABLE 3.—*Services of physicians and other practitioners in connection with illness in four geographic sections* [1]*—7,434 canvassed white families in 14 States, 1928–31*

Type of rate	All 4 [1] sections	New York State	North Central [1]	South [1]	California
	Simple means of annual rates in 3 city-size classes [2]				
Total illnesses [3] per 1,000 population	830	887	791	828	845
Calls [4] per 1,000 population.					
Calls by any practitioner	2,641	2,637	2,551	2,621	3,147
Calls by all private physicians and specialists	2,134	2,049	2,079	2,323	2,161
Home calls by private general physicians	1,063	1,260	899	1,250	878
Clinic calls [4]	311	456	255	223	535
Calls by nonmedical practitioners	196	132	217	75	451
Calls by any practitioner per total case	3.18	2.97	3.23	3.17	3.72
Population under observation	32,686	7,164	14,313	7,554	3,655

[1] The geographic areas used were: North Central, Illinois, Ohio, Michigan, Indiana, Wisconsin, Minnesota, and Kansas; South, District of Columbia, Virginia, West Virginia, Tennessee, Georgia; the Northeast is represented by New York State, and the West by California. The families in Massachusetts, Connecticut, Colorado, and Washington State are not included.

[2] These rates are not comparable with others in this paper (except table 2) because (*a*) they are built up from individual summary cards without allowance for occasional cases with an unknown number of calls, (*b*) they are not adjusted for age, (*c*) they are not based on all of the canvassed families, and (*d*) they are simple means of rates for 3 city-size classes.

[3] All illness, both attended and not attended by doctors.

[4] Calls in connection with illness except that clinic care includes also calls for immunization, well-baby care, and health (including school) examination.

There is some variation in the different geographic sections in the illness rate per 1,000 population, but the variation in the volume of medical care is much greater than can be explained by differences in illness rates. In calls by all practitioners per 1,000 population, the only large variation in the different regions is for California, which showed a 19 percent excess over the rate for all regions combined. This high rate for California is accounted for by calls to clinics and to nonmedical practitioners; calls to private physicians are about the same in California as in the other regions. The rate of clinic calls (including services to the well and the sick) per 1,000 surveyed population in California was 72 percent above that for all sections combined, with New York second, with a rate that was 47 percent above the figure for all regions. The North Central and South were low in clinic calls, their rates being 18 and 28 percent, respectively, below

[18] See table 2 for the city-size classes used

that for all sections. The California rate for calls by nonmedical practitioners shows an excess of 130 percent over the rate for all regions, being more than twice as high as the next highest section, the North Central, which was 11 percent above the rate for all regions. New York State and the South had low rates for nonmedical calls, 33 and 62 percent, respectively, below the rate for all sections combined.

Family income and the volume of medical care.—Home, office, and clinic calls on account of illness per 1,000 population are about twice as frequent among families with annual incomes of $5,000 or over as among those with less than $1,200 annual income (*16*, p. 283). Calls by nonmedical practitioners, although small for all groups, show an even greater relative increase with income than calls by physicians, the income group above $5,000 having about three times as many such calls per 1,000 population as the lowest income group, under $1,200 per year. Thus, those able to pay are more largely the patrons of the nonmedical practitioners such as osteopaths, chiropractors, and faith healers. Clinic calls, on the other hand, are quite largely concentrated in the low income groups; the rate for clinic calls per 1,000 persons among families with $5,000 or more income was only one-fourth of that for families with less than $1,200 income.[19] In clinic calls, as in calls by physicians and nonmedical practitioners, the intervening income groups have rates falling logically between the extremes here quoted.

The excess in the volume of medical care received by the higher income groups is due in large part to a higher proportion of cases being attended by a doctor but in part to a higher average number of calls per attended case. In the lowest income group, 66 percent of the cases were attended by some practitioner, as compared with 90 percent for families with $5,000 or more income. The average number of calls per total case was 66 percent higher, and the average calls per attended case 22 percent higher for the group with incomes of $5,000 or over than for families with less than $1,200 annual

IV. DISTRIBUTION OF DOCTORS' CASE AND CALL LOADS ACCORDING TO DIAGNOSIS

The relative frequency of the different diagnosis groups among the cases that consult a doctor is of interest. From the point of view of the doctor, this distribution gives a picture of the diagnosis distribution of his case load. However, the distribution of cases is different

[19] The concentration of clinic calls in low income families would be even greater if private group clinics were excluded and the tabulation limited to public clinics.

[20] The report of the Committee on the Costs of Medical Care considers in great detail the relationship of family income to the volume of medical care, further data may be found in that report (*16*).

from the distribution of calls, because some diseases require more calls than others.

Figure 3 shows first such distributions for cases and calls for all types of practitioners combined. The diseases[21] designated as "minor" respiratory constituted 27 percent of all cases attended by any type of practitioner and received 15 percent of all calls to or by

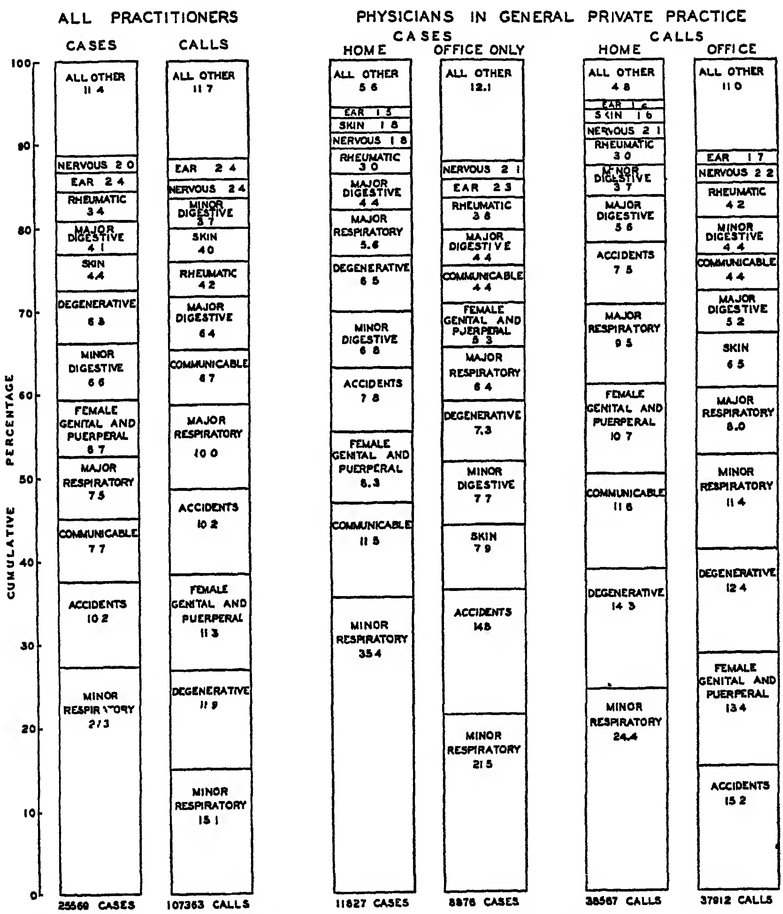

FIGURE 3.—Distribution of attended cases and of doctors' calls according to broad disease groups for the whole practice of all types of healers and for the home as compared with the office practice of private general physicians—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Based on age-adjusted rates in Appendix tables.)

those practitioners. In terms of attended cases, accidental injuries were second, with 10 percent, and the calls on such cases were also 10 percent of the total; however, accidents were exceeded in calls by the

[21] The diagnosis group names give a general idea of the types of diseases included; for details see Appendix table 5 and its footnotes. Figures 1 and 2 of a preceding paper (*15*) show graphically the make-up of each group in terms of the frequency of specific diagnoses and the average duration in terms of days in bed.

degenerative diseases (12 percent of calls) which were seventh in frequency of attended cases (6 percent), and also by female genital and puerperal diagnoses (11 percent of calls) which were fifth in attended cases (7 percent). Communicable diseases were third in frequency of attended cases (8 percent) but sixth in doctors' calls (7 percent).

Relative importance of different diagnoses in home and office practice.—Of perhaps more interest than the total practice is the distribution according to diagnosis of cases and calls to the home as compared with the office practice of doctors. In this study this distinction was made only for private physicians not designated as specialists, so the comparison will be limited to these general medical practitioners; the cases of such doctors constituted 81 percent of all cases attended by any practitioner, and 72 percent of all calls.

In these data, office cases include only those with all attendance at the office of the physician; office calls, however, include all calls at the office of the physician even though the patient had other calls at home or in a hospital. Home calls include all in which a private physician went to the patient, usually at home but occasionally in a hospital. Figure 3 shows the diagnosis distribution of the case and call loads of the private physician in home and office practice. It is surprising to find that minor respiratory diseases make up 35 percent of all cases with home calls; communicable diseases (11 percent) and female genital and puerperal diagnoses (8 percent) are second and third in frequency. Apparently a home call on a case does not necessarily mean that it is serious or of long duration, but rather that, at the particular time, it was inadvisable for the patient to go to the doctor's office ; the inadvisability of such a trip may have been due to the condition of the patient, as in respiratory or puerperal illness, or to the communicable nature of the disease. Of the cases that had office calls only, minor respiratory is also the most frequent diagnosis, 21 percent, as compared with 35 percent for minor respiratory in home cases. The next most frequent diagnoses are quite different from those for home cases; accidental injuries are second in office cases (15 percent), skin diseases third (8 percent), and minor digestive disorders fourth (8 percent). Accidental injuries ranked fourth among home cases (8 percent), skin diseases ranked eleventh (2 percent), and minor digestive disorders fifth (7 percent).

The diagnosis distribution of calls perhaps gives a better index of the office as compared with the home practice of physicians. Of all home calls, minor respiratory diseases received the largest proportion, 24 percent, but among the office calls this diagnosis was fourth in frequency, with 11 percent. The diagnosis that received the largest proportion of office calls was accidental injuries, with 15 percent; in terms of home calls, accidental injuries was sixth, with 7 percent.

The second most frequent group for office calls is female genital and puerperal diagnoses, with 13 percent, as compared with fourth position in the proportion of home calls, with 11 percent; it must be remembered that prenatal calls to the doctor were tabulated as a part of the service received on a maternity case, which procedure probably accounts for the large number of office calls for this diagnosis group. The degenerative diseases are third in office calls (12 percent), and second in home calls (14 percent).

Relative importance of different diagnoses in various types of medical and nonmedical practice.—In this study the type of attendant was recorded in considerable detail; data are available, therefore, for comparing the diagnosis distribution of cases and calls not only for general medical practitioners but also for medical specialists, private and public clinics, osteopaths, chiropractors, and other nonmedical practitioners. Because of the small number of cases attended by some of these practitioners, it was impracticable to build up adjusted rates for each diagnosis group; the rates in table 4 and the percentages in figures 4 and 5 are based on actual cases and calls with no adjustment for the fact that the surveyed group contains an excess of children and young married adults and a deficiency of old people. Therefore, the data in these figures are not strictly comparable with those in figures 3 and 6, which are based on adjusted rates.

Figure 4 shows for each type of practitioner the proportion of his cases that were in each broad diagnosis group, and figure 5 shows the proportion of calls that were made in connection with the same diagnosis groups. Private physicians not designated as specialists attended 81 percent of all cases and made 72 percent of all calls in connection with illness, so the diagnosis distribution of their cases may be examined first. Of the cases attended by these general practitioners, 30 percent were minor respiratory diseases and 19 percent of their calls were devoted to such cases. The next diagnoses in order of case frequency are accidental injuries (11 percent), communicable diseases (11 percent), minor digestive (7 percent), major respiratory (6 percent), and female genital and puerperal (6 percent). In terms of calls, minor respiratory diseases (19 percent), and accidental injuries (11 percent) remain first and second, but female genital and puerperal (11 percent) is third, communicable diseases (10 percent) fourth, and degenerative diseases (9 percent), fifth.

The diagnosis distribution of cases attended by private group clinics (fig. 4) is fairly similar to those attended by general practitioners; the chief difference is a smaller percentage of communicable diseases and a larger percentage of skin diseases. The distribution of private group clinic calls (fig. 5) is less similar to general practitioners' calls, but roughly it bears out the above observations about cases.

Public clinics handled fewer minor respiratory and communicable cases and more major respiratory (including respiratory tuberculosis, tonsillectomy, pneumonia, sinusitis, and chronic nasal affections), female genital and puerperal, and accident cases than was true of private general practitioners. In terms of calls, major respiratory (15 percent), female genital and puerperal (13 percent), and communicable (12 percent), were the three most important groups.

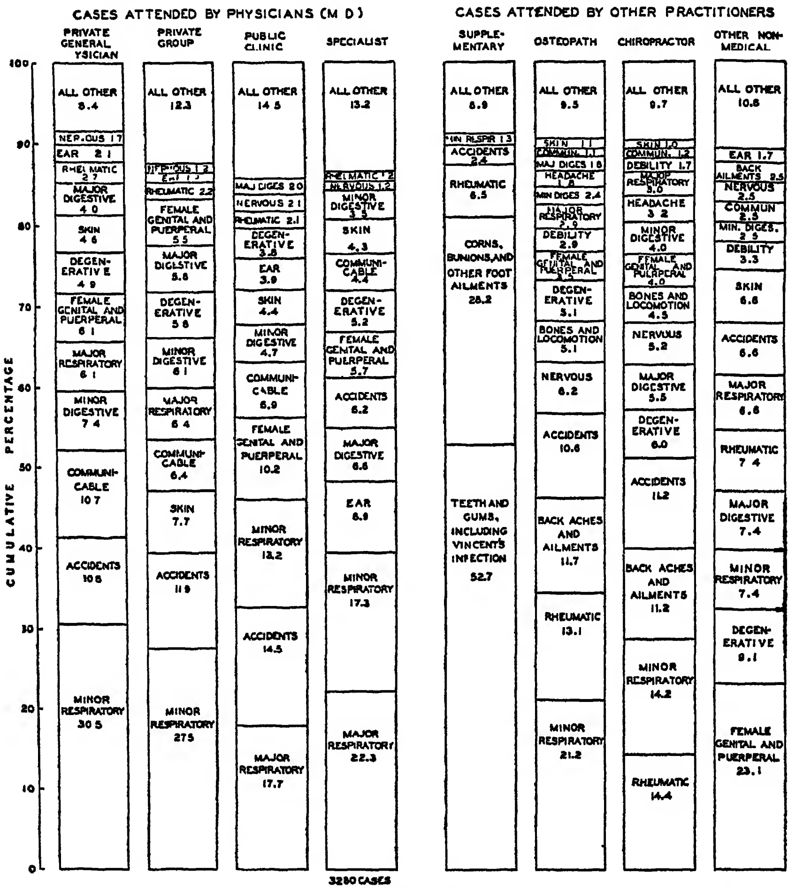

FIGURE 4.—Distribution of cases attended by different types of practitioners according to broad disease groups—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Based on actual cases of all ages with no adjustment for age.)

Among medical specialists of all kinds, 22 percent of the cases were major respiratory, with 17 percent in the minor respiratory group (fig. 4). Next come ear and mastoid (9 percent), major digestive (7 percent), and accidential injuries (6 percent). In terms of calls (fig. 5), major respiratory diseases had 22 percent of the total specialist calls, major digestive, 11 percent, minor respiratory, 11 percent, female

genital and puerperal, 8 percent, and ear and mastoid, 9 percent. In the practice of specialists, major respiratory, major digestive, and ear and mastoid diseases rank considerably higher than in the other types of medical practice that have been examined.

Supplementary practitioners as here used include dentists, chiropodists, and physiotherapists, that is, subspecialties which supplement the work of physicians in the care of illness in a community. It must

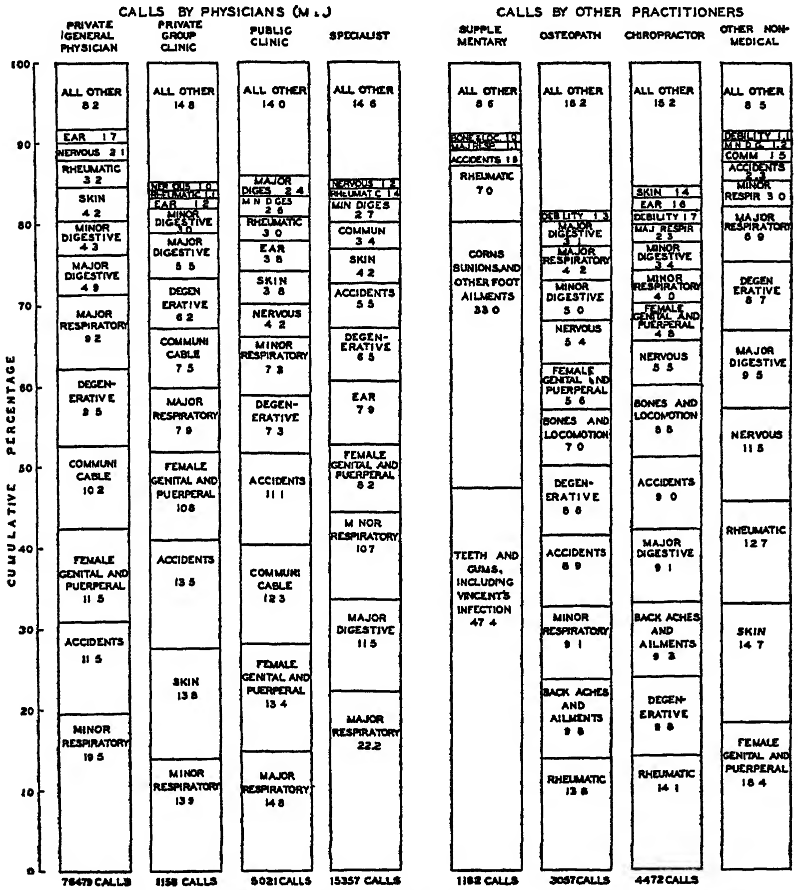

FIGURE 5.—Distribution of calls by different types of practitioners according to broad disease groups—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Based on actual calls on cases of all ages with no adjustment for age.)

be remembered that the only care here considered is that in connection with illness. Of the total of 550 *illnesses* attended by these practitioners, 356, or 65 percent, were attended by dentists,[22] 163, or 30

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[22] These 356 *illnesses* attended by dentists are only a small percentage of the total of 10,116 cases of dental care in these families, largely without illness in the usual sense. See preceding paper for details on all dental care (*13*). Of the 356 *illnesses* treated by dentists, 119 cases had a physician and 4 had a nonmedical practitioner in attendance also.

percent, by chiropodists, 28, or 5 percent, by physiotherapists (without the supervision of a physician), and 3, or 0.5 percent, by optometrists. Since it is a miscellaneous group, the diagnosis distribution is quite different from preceding distributions. Because of the frequency of certain diagnoses for supplementary practitioners, two new classes have been used: Teeth and gums, including Vincent's infection; and corns, bunions, and other foot ailments. For other nonmedical practitioners, the following diagnoses are shown separately for the same reasons of exceptional frequency: backaches and back ailments; affections of the bones, joints, and other organs of locomotion; headache; and debility. These groups are shown in the bars in figures 4 and 5 if they include 2 percent or more of the total cases or calls.

Illnesses associated primarily with the teeth and gums and treated by dentists constitute 53 percent of the cases and are estimated to cause 47 percent of the calls in connection with *illness* treated by the supplementary practitioner group (figs. 4 and 5). But the dentist's care of illness is important in other categories also. Of the illnesses from rheumatic diseases (including neuralgia and neuritis) that were treated by the supplementary group, three-fourths were dentists' cases, presumably for the treatment or extraction of teeth suspected of being foci of infection responsible for the arthritis or neuritis; the other one-fourth were treated by physiotherapists. Accidental injuries are also treated in dental practice, presumably to repair damage done to the teeth.

Chiropodists' cases of corns, bunions, and other foot ailments constituted 28 percent of the cases and 33 percent of the calls of the supplementary practitioner group.

Osteopaths' cases (fig. 4) tend to be concentrated in a few diagnoses, minor respiratory (21 percent), rheumatic diseases (13 percent), backaches and back ailments (12 percent), and accidents (11 percent). In terms of calls (fig. 5), rheumatic diseases is first (14 percent), followed by backaches and back ailments (10 percent), minor respiratory (9 percent), accidents (9 percent), and degenerative diseases (9 percent).

Chiropractors' cases are somewhat more scattered over the various diagnosis groups. Rheumatic diseases, with 14 percent of the cases and the same percentage of the calls, is first, followed by minor respiratory, with 14 percent of the cases, backaches and back ailments (11 percent), and accidents (11 percent). In terms of calls, degenerative diseases (10 percent), are second to rheumatic diseases; the next four diagnoses, backaches and back ailments, major digestive diseases, accidents, and diseases of the bones and organs of locomotion are each responsible for 9 percent of the calls.

The miscellaneous other nonmedical practitioners include Christian Science and other faith healers, naturopath, midwife, and others.

Only 121 cases were reported as treated by this type of practitioner; 22 of these, or 18 percent, were births and all were attended by midwives. In terms of calls, also, female genital and puerperal is the largest group.

The lack of definite diagnoses for illnesses treated only by nonmedical practitioners tends to increase the number of ill-defined cases; in spite of this tendency the picture seems reasonably true, namely, that it is the various rheumatic and other indefinite chronic pains that bring the patient to a nonmedical practitioner. Aside from this, sprains and other cases where massage therapy is commonly applied also fall into the hands of such practitioners.

Table 4 also shows for each type of practitioner and for each broad diagnosis, the average calls per case attended. For all causes of illness, average calls per attended case of 3.7 for general medical practitioners, 3.5 for private group clinics, 4.1 for public clinics, and 4.7 for medical specialists may be contrasted with average calls per attended case of 6.8 for osteopaths, 11.1 for chiropractors, and 7.1 for other nonmedical practitioners.[23]

V. FREQUENCY AND VOLUME OF DOCTORS' CARE OF MALES AND FEMALES FOR BROAD DISEASE GROUPS

The relative importance of different broad diagnosis groups in terms of attended cases and doctors' calls for various kinds of practitioners has been discussed. For all practitioners and for patients of both sexes combined (fig. 3), minor respiratory diseases were by far the most frequent diagnosis for attended cases; in terms of calls by any practitioner the minor respiratory diseases were less overwhelmingly important, the degenerative diseases being a fairly close second, and female genital and puerperal diagnoses having almost as many calls per 1,000 persons of both sexes as the degenerative diseases.

Relative importance for males and females of different diagnoses in attended cases and doctors' calls.—Figure 6 compares males and females with respect to the percentage of all attended cases and of all doctors' calls that were made in connection with the various broad diagnosis groups. Among males, minor respiratory diseases constituted 29 percent of the attended cases, with accidents (15 percent) and communicable diseases (9 percent) as the second and third most frequent types of case. Among females the minor respiratory diseases constituted 26 percent of the attended cases, with female genital (11 percent) as the second cause, followed by accidents (7 percent), and communicable diseases (7 percent).

[23] These figures on calls per case are based on actual cases and calls and not on rates corrected for age, as in some of the other tables.

TABLE 4.—*Rates [1] per 1,000 total population for illnesses attended and calls by each type of practitioner, by broad diagnosis groups—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

[Sole or primary diagnoses only]

Diagnosis [2] group	Physician (M. D.)					Supplementary [5] practitioner	Nonmedical practitioner		
	Any physician or clinic (all M. D.)	Private general [3] physician	Specialist [4]	Private group clinic	Public clinic		Osteopath	Chiropractor	Other [6] nonmedical practitioner
	Attended cases per 1,000 population during year								
All causes	634	537	85.1	8.48	31.78	14.27	11.73	10.43	3.14
Minor respiratory diseases	185	164	14.7	2.33	4.20	[7].18	2.49	1.48	[7].23
Other respiratory diseases	51	33	19.0	.54	5.63	[8].67	.34	.31	[7].21
Minor digestive diseases	45	40	2.9	.52	1.48	[7].05	.29	.42	[7].08
Other digestive diseases	24	21	5.6	.49	.65	[7].08	[7].21	.57	[7].23
Communicable diseases	64	58	3.7	.54	2.18	[7].08	[7].13	[7].13	[7].08
Ear and mastoid diseases	17	11	7.6	[7].10	1.22	[7].05	[7].05	[7].08	[7].05
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis	11	9	1.1	[7].10	.67	[7].08	.73	.54	[7].08
Rheumatism and related diseases	16	14	1.0	[7].18	.67	.93	1.53	1.50	[7].23
Degenerative diseases	30	26	4.5	.49	1.19	[7].05	.60	.62	.29
Skin diseases	29	25	3.7	.65	1.40	[8].88	[7].13	[7].10	[7].21
Female genital and puerperal diagnoses	38	33	4.9	.47	3.24	--------	.42	.42	.73
Accidental injuries	65	58	5.2	1.01	4.62	.31	1.25	1.17	[7].21
All other diseases	59	45	11.3	1.04	4.62	[8] 10.87	[9] 3.58	[9] 3.09	[9].52
	Annual calls per 1,000 population								
All causes	2,543	1,984	398.4	30.0	130.3	30.7	79.3	116.0	22.2
Minor respiratory diseases	444	388	42.8	4.2	9.4	[7].3	7.2	4.6	[7].7
Other respiratory diseases	293	183	88.3	2.4	10.3	[8] 5.8	3.3	2.7	[7] 1.5
Minor digestive diseases	101	86	10.9	.9	3.4	[7].1	4.0	3.9	[7].3
Other digestive diseases	148	98	45.8	1.7	3.1	[7].1	[7] 2.5	10.6	[7] 2.1
Communicable diseases	234	202	13.4	2.3	16.0	[7].2	[7].3	[7].8	[7].3
Ear and mastoid diseases	72	35	31.4	[7].4	4.9	[7].1	[7].4	[7] 1.9	[7].1
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis	51	41	4.6	[7].3	5.5	[7].3	4.3	6.4	[7] 2.5
Rheumatism and related diseases	73	63	5.4	[7].3	3.9	2.2	10.9	16.4	[7] 2.8
Degenerative diseases	225	188	26.1	1.8	9.5	[7].1	6.8	11.3	1.9
Skin diseases	109	83	16.9	4.1	5.0	[8] 2.0	[7].2	[7] 1.7	[7] 3.3
Female genital and puerperal diagnoses	281	228	32.6	3.2	17.5	--------	4.5	5.6	4.1
Accidental injuries	209	229	22.1	4.0	14.5	.6	7.1	10.5	[7].5
All other diseases	213	162	58.3	4.4	18.3	[8] 19.0	[9] 27.8	[9] 30.7	[9] 2.0
	Mean calls per case attended								
All causes	4.0	3.7	4.7	3.5	4.1	2.1	6.8	11.1	7.1
Minor respiratory diseases	2.4	2.4	2.9	1.8	2.2	(7)	2.9	3.1	(7)
Other respiratory diseases	5.8	5.5	4.6	4.3	3.4	8.6	9.8	8.6	(7)
Minor digestive diseases	2.2	2.2	3.7	1.7	2.3	(7)	14.0	9.4	(7)
Other digestive diseases	6.2	4.6	8.2	3.4	4.7	(7)	(7)	18.5	(7)
Communicable diseases	3.6	3.5	3.6	4.1	7.3	(7)	(7)	(7)	(7)
Ear and mastoid diseases	4.1	3.1	4.1	(7)	4.0	(7)	(7)	(7)	(7)
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis	4.7	4.4	4.3	(7)	8.2	(7)	5.9	11.7	(7)
Rheumatism and related diseases	4.6	4.3	5.3	(7)	5.8	2.3	7.2	10.9	(7)
Degenerative diseases	7.6	7.2	5.8	3.7	7.9	(7)	11.4	18.2	6.7
Skin diseases	3.8	3.4	4.6	6.4	3.6	2.3	(7)	(7)	(7)
Female genital and puerperal diagnoses	7.5	7.0	6.7	6.9	5.4	(7)	10.7	13.4	5.6
Accidental injuries	4.1	3.9	4.2	4.0	3.1	1.8	5.7	9.0	(7)
All other diseases	4.1	3.6	5.2	4.2	4.0	1.7	7.8	12.9	3.9

See footnotes at end of table.

TABLE 4.—*Rates per 1,000 total population for illnesses attended and calls by each type of practitioner, by broad diagnosis groups—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*—Continued

Diagnosis group	Physician (M. D.)					Supplementary practitioner	Nonmedical practitioner		
	Any physician or clinic (all M. D.)	Private general physician	Specialist	Private group clinic	Public clinic		Osteopath	Chiropractor	Other nonmedical practitioner
	Number of cases and calls								
Cases, all causes	24,432	20,705	3,280	327	1,225	550	452	402	121
Calls, all causes	98,013	76,479	15,357	1,156	5,021	1,182	3,057	4,472	855

[1] Crude rates with no adjustment for age. See note 1 of table 1 for definitions of cases and attendance. When one case had two types of attendant, it is counted for both, but total cases for all physicians (M. D.) is an unduplicated count of those attended by one or more physicians.
Sums of case and call rates for the different types of nonmedical practitioners in this table will not add to totals for nonmedical practitioners in table 1 because: (*a*) Dentists are not included in the nonmedical group in table 1, but chiropodists are included. (*b*) Cases with two kinds of nonmedical practitioners would count in this table for both practitioners, but would count only once in table 1. (*c*) Attended cases with an unknown number of calls were used in this table as having the average calls for the same detailed diagnosis attended by the same type of practitioner, but in table 1 they were put in at broad group averages for the several types of practitioners combined. Except for dentists (for whom calls were not recorded), the numbers of attended cases with unknown numbers of calls were relatively few, but they account for small discrepancies in total numbers of calls.

[2] For International List numbers, see table 5. For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).

[3] Private general physicians (M. D.) are those not designated by family informants as specialists; attendance may have been in office, home, or upon a private patient in a hospital.

[4] Specialist here refers to a physician so designated by the family informant, regardless of listing in any directory of physicians. A few cases and calls by specialists in clinics are included here and in clinics also (2.0 and 1.7 calls for all diagnoses per 1,000 population for public and private clinics, respectively).

[5] Supplementary practitioner includes dentist, chiropodist, physiotherapist, and optometrist.

[6] Other nonmedical practitioners include Christian Science or other faith healer, naturopath, midwife, and a few miscellaneous others.

[7] Less than 10 attended cases; mean calls per case not computed.

[8] For supplementary practitioners, the following diagnoses included in various broad groups occur frequently:

	Percent of all—		Classified as—
	Cases	Calls	
For dentists:			
Teeth and gums	48.9	29.6	All other diseases.
Vincent's angina	3.8	17.8	Other respiratory diseases.
For chiropodists:			
Corns and ingrowing nails	5.5	5.7	Skin diseases.
Bunions and fallen arches	4.7	7.2	All other diseases.
Other foot trouble	18.0	20.1	All other diseases.

[9] For osteopaths, chiropractors, and other nonmedical practitioners, the following diagnoses included with "all other diseases" occur frequently:

	Osteopath Percent of all—		Chiropractor Percent of all—		Other nonmedical Percent of all—	
	Cases	Calls	Cases	Calls	Cases	Calls
Backaches and back ailments	11.7	9.8	11.2	9.3	2.4	0.9
Headache	1.8	.9	3.2	.8		
Bones, joints, and locomotion	5.1	7.0	4.5	8.8		
Debility	2.9	1.3	1.7	1.7	3.1	1.0

In terms of calls (fig. 6), minor respiratory diseases received 17 percent of all calls for males, with accidental injuries second (16 percent), followed by other respiratory (12 percent), and degenerative diseases (12 percent). Among females, the female genital and puerperal diagnoses received the greatest number of calls, 18 percent of the total, followed by minor respiratory (14 percent), degenerative (12 percent), and major respiratory diseases (9 percent).

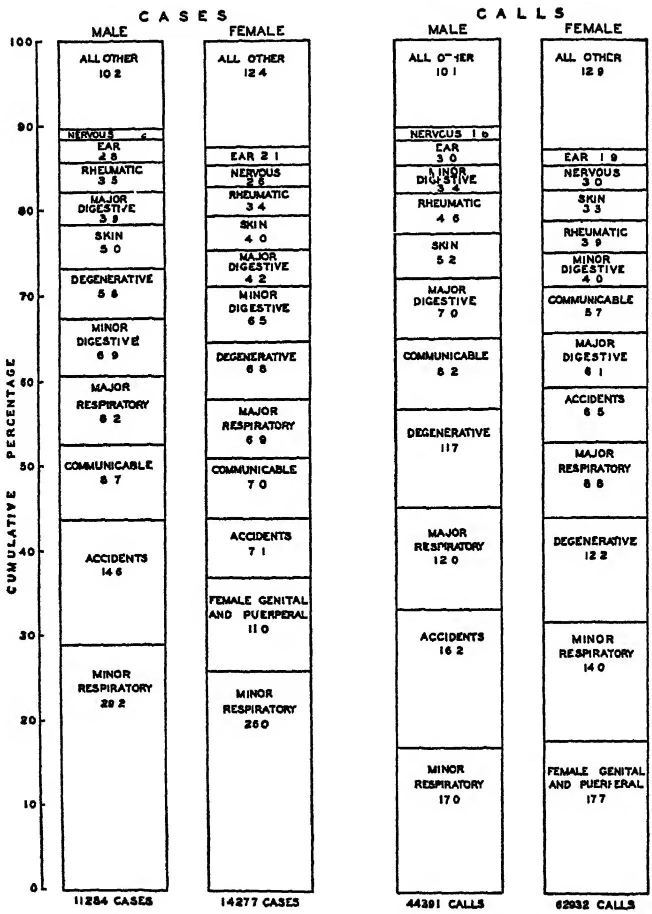

FIGURE 6.—Distribution for males and females of attended cases and calls by all practitioners according to broad disease groups—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Based on age-adjusted rates in Appendix tables 5 and 8.)

Frequency of attended cases and volume of doctors' calls at specific ages for each sex.—The comparison of the frequency of attended cases and of doctors' calls upon illness from all causes which was discussed in a preceding section may be extended to cases of the various diagnoses. Figures 7 and 8 show several types of rates for males and

females of specific ages, namely, (*a*) attended cases per 1,000 population, (*b*) total doctors' calls per 1,000 population, (*c*) home calls by private general physicians per 1,000 population, and (*d*) total calls per attended case. Appendix tables 5, 8, 10, and 11 show the data plotted in figures 7 and 8; appendix tables 6 and 9 show similar data for cases and calls by private physicians not designated as specialists; and table 7 shows cases attended at home by these private general physicians.

In terms of attended cases per 1,000 persons, the rates are almost invariably higher for women than for men. Of the total cases reported in the whole study, 77 percent of those among males and 79 percent of those among females were attended by a physician or other practitioner (table 1); so that the rates for attended cases reflect quite largely the same differences between the sexes that were noted for all cases in a preceding paper (*14*).

The percentage of cases of all ages that were attended by a doctor ranges in the 13 broad diagnosis groups from 64 for minor respiratory diseases to 95 for degenerative diseases and 97 percent for female genital and puerperal diagnoses. In every one of the 12 diagnosis groups common to the two sexes, the percentage of cases attended by a doctor is nearly the same for males and females; the actual differences between the percentages range from zero for communicable diseases to 4.5 for rheumatic diseases.[24] Thus, the generally higher incidence of attended cases among women than among men which is seen in figures 7 and 8 reflects more illness among women rather than more frequent medical attendance upon the same amount of illness. The same factor is reflected to a considerable extent in total calls and home calls per 1,000 population; it is seen also in figures 7 and 8 that the average calls per attended case do not differ greatly as between the sexes in any of the diagnosis groups.

Similarly, the age curves in these charts for attended cases and calls per 1,000 population reflect largely the age incidence (*14*) of the various diagnoses rather than variation with age in the proportion of cases attended or in doctors' calls per case. Thus, for most of the diagnosis groups there is less age variation in calls per attended case than in the incidence of attended cases or the volume of either total or home calls per 1,000 population.

A detailed discussion of the curves in figures 7 and 8 does not seem necessary, but a few exceptions to the general rules pointed out above may be noted. (*a*) In the minor respiratory diseases the home calls per 1,000 adult women show a larger relative excess over those for

[24] The percentage of cases attended by a doctor is given by age and sex for all diagnoses in table 1. While the percentages are not given for the diagnosis groups, they can be obtained by age and sex by relating the rates for attended cases in Appendix table 5 of this paper to corresponding rates for all cases in Appendix table 7 of a preceding paper (*14*).

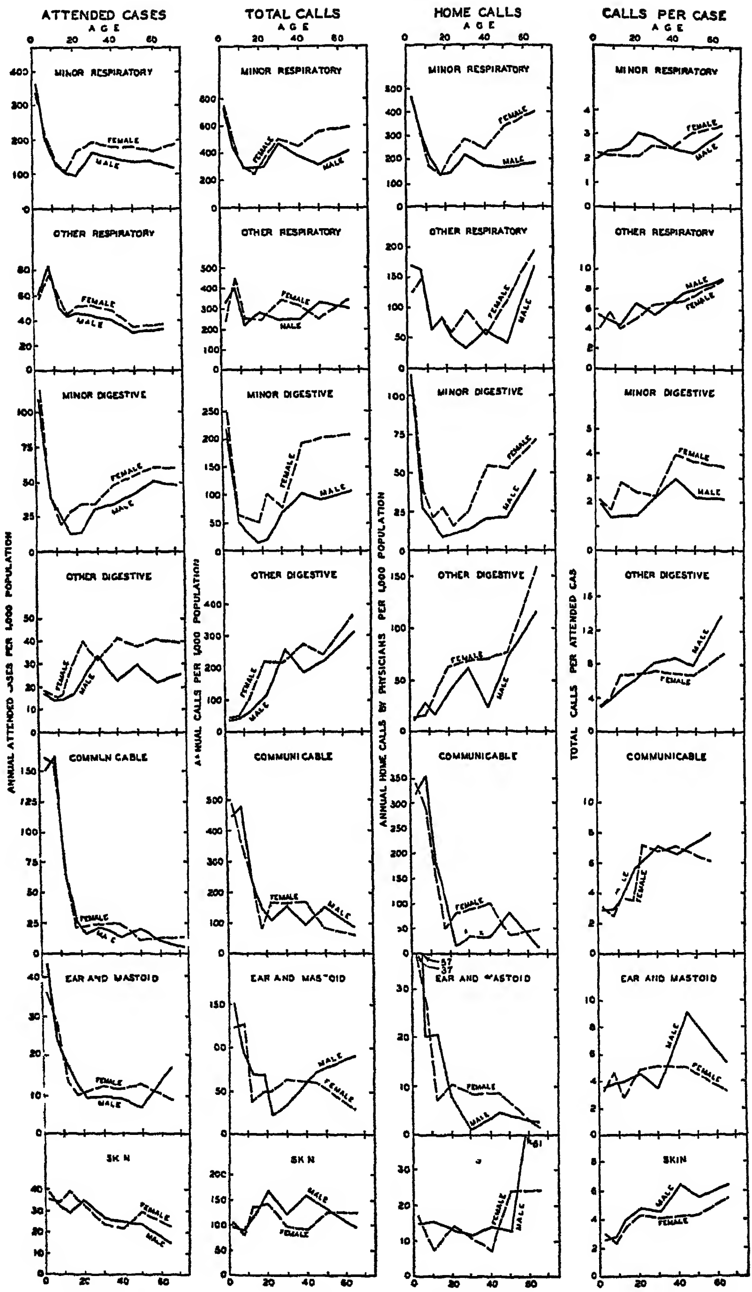

FIGURE 7.—Age and sex variation in attended cases and doctors' calls for illness from broad disease groups, as measured by various types of rates—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31. (Scales are so made that the adjusted rate for all ages of both sexes represents an interval on the vertical rate scale that corresponds to 30 years on the horizontal age scale. Rates are given in Appendix tables 5–11, with footnotes for broader age groups used in some of the graphs.)

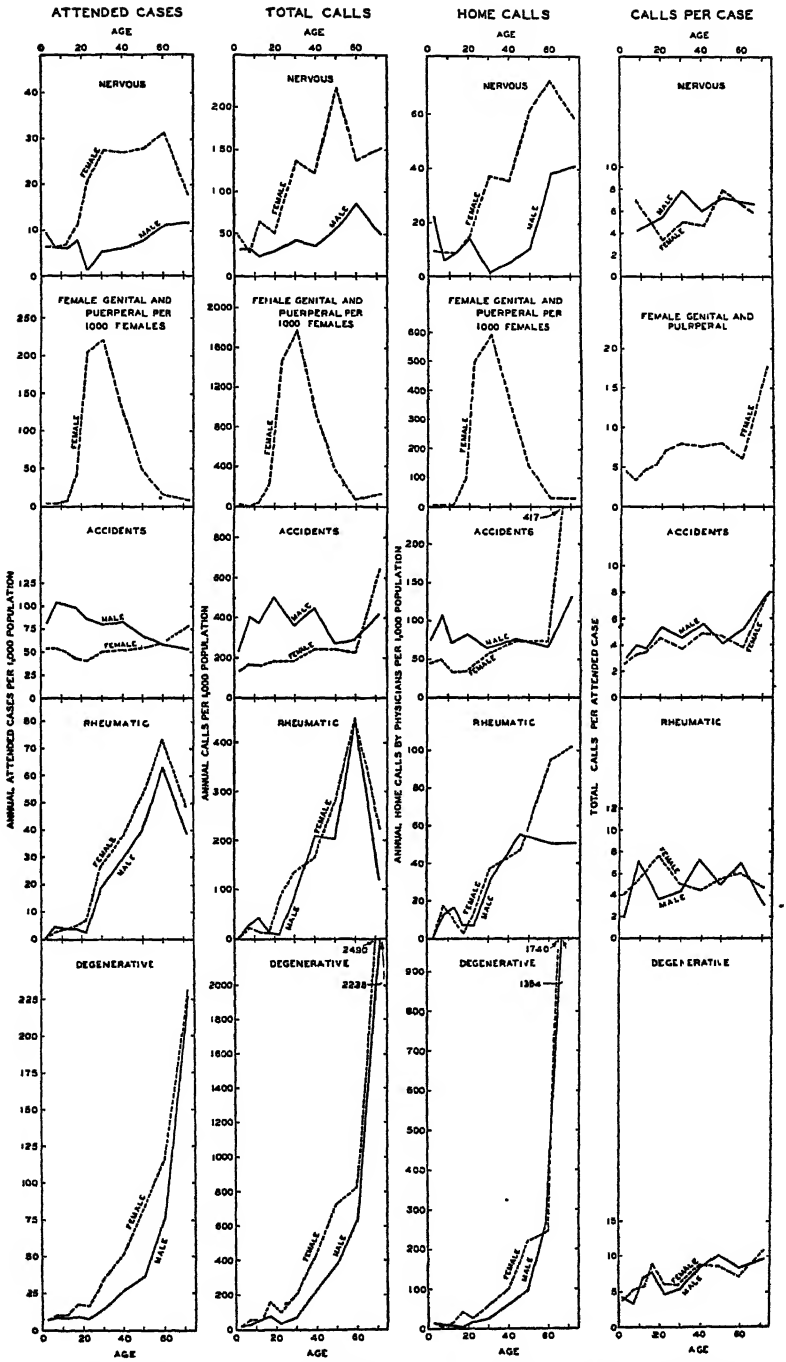

Figure 8.—Age and sex variation in attended cases and doctors' calls for illness from broad disease groups (continued).

men than do the total calls or the attended cases. (*b*) The total and home calls on adult women for minor digestive diseases show a larger relative excess over those for men than does the incidence of these diagnoses (*14*). (*c*) Home calls per 1,000 for minor digestive diseases among children under 5 years and for persons over 55 years of age are relatively greater than is the incidence of attended cases at these ages. (*d*) The calls per attended case of communicable disease are definitely greater for persons over 20 years of age than for children under 15. This rise with age may be due in part to a greater severity of some communicable diseases among adults, and in part to the changing character of the diseases included in the group; that is, in the adult ages the common childhood diseases would constitute a smaller proportion of the total cases classified as communicable than would be true in the younger ages.

As in total incidence and days of sickness, the nervous diseases show the largest differences between the sexes with respect to attended cases and with respect to total and home calls per 1,000 persons under observation. However, the calls per attended case were not greatly different for the two sexes.

VI. SUMMARY

Data on the frequency of illness and the volume of medical care received were recorded for a 12-month period between 1928 and 1931 by periodic canvasses of 8,758 white families in 130 localities in 18 States. The visits were made at intervals of 2 to 4 months. Illnesses causing symptoms that lasted for one day or longer within the study year were recorded, together with the number of doctors' calls on the case.

The surveyed families include representation from nearly all geographic sections, from rural, urban, and metropolitan areas, from all income classes, and of both native and foreign-born persons.

The recorded illness from all causes amounted to 823 cases per 1,000 persons. Of the total cases, 79 percent were attended by some type of practitioner, a rate of 647 attended cases per 1,000 population. There were 4.6 calls by all practitioners per attended case, with a total of 2,949 calls during the year per 1,000 canvassed population. Of the total attended cases, 81 percent were attended by physicians in general practice, and these doctors made 72 percent of the total calls. Of the 526 cases per 1,000 population that were attended by physicians in general practice, 294 per 1,000 had one or more home calls, the other 232 having office calls only. Fifty-six percent of these cases had home calls and 50 percent of the total calls by these physicians were home calls.

Of the total attended cases, 12 percent had a physician who was designated by the family as a specialist; these specialists made 14 per-

cent of the total calls. Of the total attended cases 5 percent were attended by public clinics and another 1 percent by private group clinics. Supplementary practitioners such as dentists and chiropodists and nonmedical practitioners such as osteopaths and chiropractors attended 5 percent of all attended illnesses, but their calls amounted to 9 percent of the total calls.[25]

The age curves of attended cases and calls per 1,000 population vary considerably for different types of practitioners, and for home as compared with office attendance. Considering total cases and calls by all practitioners there is a large excess in the rates per 1,000 for adult women over adult men of corresponding ages, even when female genital and puerperal diagnoses are excluded (figs. 1 and 2). This excess is due to more illness rather than to more doctors' calls per case.

The volume of medical care in terms of doctors' calls per 1,000 population is greater in large cities than in small towns and rural areas; and there is some geographic variation also. Striking geographic differences occur in the extent of care by nonmedical practitioners and by clinics; the West, as represented by California, stands at the top in nonmedical practice and also in clinic practice, with New York State second in clinic practice but below the average in nonmedical practice.

These data afford interesting indications of the diagnosis distribution of the practice of different types of doctors. For all practitioners, 27 percent of the cases and 15 percent of the calls are due to minor respiratory diseases, that being the most frequent category. In home practice, the minor respiratory diseases are even more important, constituting 35 percent of all cases with a home call and 24 percent of the total home calls. In terms of office calls, however, the minor respiratory diseases are fourth in frequency, being outranked by accidental injuries, female genital and puerperal diagnoses, and the degenerative diseases of old age (fig. 3).

The diagnosis distribution of cases and calls varies markedly as between physicians and nonmedical practitioners such as osteopaths and chiropractors (figs. 4 and 5).

The age curves and the differences between the sexes in attended cases and doctors' calls per 1,000 population for the several diagnosis groups reflect differences in incidence more than differences in the extent of medical care. In other words, there is less variation with age and less variation between the sexes in the number of doctors' calls per attended case than in the number of attended cases and calls per 1,000 population (figs. 7 and 8).

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[25] Since some of the cases had more than one type of attendant, the sum of the above percentages of cases amounts to more than 100 percent.

VII. REFERENCES

Preceding Papers in this Series on 9,000 Families

(*1*) Collins, Selwyn D.: Causes of illness. Pub. Health Rep., **48**: 283–308 (Mar. 24, 1933) (Reprint 1563).

(*2*) ———: Frequency of health examinations. Pub. Health Rep., **49**: 321–346 (Mar. 9, 1934) (Reprint 1618).

(*3*) ———: Frequency of eye refractions. Pub. Health Rep., **49**: 649–666 (June 1, 1934) (Reprint 1627).

(*4*) ———: A general view of the causes of illness and death at specific ages. Pub. Health Rep., **50**: 237–255 (Feb. 22, 1935) (Reprint 1673).

(*5*) ———: Age incidence of illness and death considered in broad disease groups. Pub. Health Rep., **50**: 507–525 (Apr. 12, 1935) (Reprint 1681).

(*6*) ———: Age incidence of specific causes of illness. Pub. Health Rep., **50**: 1404–1427 (Oct. 11, 1935) (Reprint 1710).

(*7*) ———: History and frequency of smallpox vaccinations and cases. Pub. Health Rep., **51**: 443–479 (Apr. 17, 1936) (Reprint 1740).

(*8*) ———: History and frequency of typhoid fever immunizations and cases. Pub. Health Rep., **51**: 897–926 (July 10, 1936) (Reprint 1758).

(*9*) ———: History and frequency of diphtheria imunizations and cases. Pub. Health Rep., **51**: 1736–1773 (Dec. 18, 1936) (Reprint 1789).

(*10*) ———: History and frequency of clinical scarlet fever cases and of injections for artificial immunization. Pub. Health Rep., **53**: 409–427 (Mar. 18, 1938) (Reprint 1917).

(*11*) ———: Frequency of surgical procedures. Pub. Health Rep., **53**: 587–628 (Apr. 22, 1938) (Reprint 1926).

(*12*) ———: Percentage of illnesses treated surgically. Pub. Health Rep., **53**: 1593–1616 (Sept. 9, 1938) (Reprint 1981).

(*13*) ———: Frequency of dental services. Pub. Health Rep., **54**: 629–657 (Apr. 21, 1939) (Reprint 2058).

(*14*) ———: Cases and days of illness among males and females, with special reference to confinement to bed. Pub. Health Rep., **55**: 47–93 (Jan. 12, 1940) (Reprint 2129).

(*15*) ———: Duration of illness from specific diseases. Pub. Health Rep., **55**: 861–893, May 17, 1940 (Reprint 2161).

Other References

(*16*) Falk, I. S., Klem, Margaret C., and Sinai, N.: The incidence of illness and receipt and costs of medical care among representative families. Publication No. 26 of the Committee on the Costs of Medical Care, University of Chicago Press, 1933.

(*17*) Pearl, Raymond: Medical Biometry and Statistics. 2nd ed. W. B. Saunders Co., 1930.

(*18*) Perrott, G. St. J., Tibbitts, Clark, and Britten, R. H.: The National Health Survey; scope and method of the Nation-wide canvass of sickness in relation to its social and economic setting. Pub. Health Rep., **54**: 1663–1687 (Sept. 15, 1939) (Reprint 2098).

(*19*) Perrott, G. St. J., and Holland, D. F.: Health as an element in social security. Annals of American Academy of Political and Social Science, **202**: 116–136 (March 1939).

VIII. APPENDIX

TABLE 5.—*Illnesses from certain causes attended by any practitioner [1] per 1,000 population of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

[Sole or primary diagnoses only]

Sex and diagnosis [2] group with International List numbers, 1920 revision	All ages [3]: Number of attended cases	All ages [3]: Adjusted [4]	All ages [3]: Crude	Age [5]: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Cases [1] attended by any practitioner per 1,000 population during year											
Minor respiratory diseases (11, pt. 97, 98, 99, pt. 107, pt. 109):													
Both sexes	7,283	176.3	188.9	352.4	202.4	131.6	112.1	139.2	183.3	166.6	157.3	152.1	157.3
Male	3,406	163.1	180.2	366.8	195.0	126.9	110.0	99.6	166.5	151.7	138.8	139.3	121.3
Female	3,875	188.2	197.4	339.4	209.7	136.3	114.2	168.2	195.8	181.6	179.9	167.4	185.4
Other respiratory diseases (31, pt. 97, 100–106, pt. 107, pt. 109):													
Both sexes	1,991	48.2	51.7	58.6	79.8	53.9	43.0	49.1	47.9	43.2	32.2	35.3	34.1
Male	943	46.1	49.9	59.5	83.3	50.0	42.6	45.9	43.3	39.9	29.8	39.8	20.6
Female	1,046	49.9	53.3	57.4	76.3	57.8	43.3	51.4	51.3	46.4	35.2	29.9	44.6
Minor digestive diseases (15, pt. 16, 112–114):													
Both sexes	1,772	43.1	46.0	111.4	37.8	21.2	21.0	25.5	32.4	41.1	46.9	55.0	54.1
Male	813	38.8	43.0	108.6	37.9	23.0	13.1	14.5	30.8	34.2	40.7	51.0	48.1
Female	959	47.3	48.9	115.1	37.7	19.4	28.9	33.5	33.7	48.1	54.4	59.8	58.8
Other digestive diseases (pt. 108, 110, 111, 115–127):													
Both sexes	945	26.4	24.5	17.1	13.8	15.3	23.3	32.6	31.9	31.5	32.8	29.9	33.1
Male	391	22.1	20.7	16.7	13.5	13.9	16.4	23.5	32.9	22.2	29.3	21.1	25.2
Female	554	30.6	28.2	17.5	14.2	16.8	30.2	39.2	31.2	41.0	37.2	40.4	39.2
Communicable diseases (1–10, 12–14, pt. 16, 17–30, 32–42):													
Both sexes	2,496	49.5	64.8	154.0	159.8	63.9	24.3	20.3	22.7	18.9	16.4	11.5	9.0
Male	1,224	48.5	64.8	150.3	162.1	62.1	26.9	16.8	22.1	14.1	20.6	11.2	4.6
Female	1,272	50.3	64.8	159.1	157.5	65.7	21.7	22.9	23.2	23.7	11.3	12.0	12.5
Ear and mastoid diseases (86):													
Both sexes	676	15.3	17.5	39.5	25.7	15.1	11.1	9.9	11.0	10.1	9.3	15.6	9.0
Male	337	15.4	17.8	43.1	24.1	16.9	12.4	8.9	9.6	8.7	6.5	19.9	11.4
Female	339	15.1	17.3	36.1	27.3	13.2	9.8	10.6	12.0	11.5	12.6	10.5	7.1
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis (70–73, 76, 81, 84):													
Both sexes	465	13.1	12.1	7.8	6.3	6.3	9.5	12.3	17.9	16.4	16.7	20.4	15.0
Male	132	6.9	7.0	9.3	6.4	6.1	7.9	1.1	5.4	6.0	7.6	11.2	11.4
Female	333	18.9	17.0	6.3	6.2	6.6	11.2	20.4	27.2	26.8	27.9	31.4	17.8
Rheumatism and related diseases (51, 52, 82, pt. 158):													
Both sexes	609	22.2	18.1	.4	4.0	3.7	4.3	4.7	23.2	32.9	45.4	67.9	44.1
Male	307	19.5	16.2	.4	5.0	3.9	3.9	2.2	18.7	28.9	39.6	63.4	38.9
Female	392	24.7	20.0	.4	3.1	3.5	4.6	6.5	26.6	36.0	52.5	73.2	48.1

[1] Cases represent periods of illness classified according to the primary cause (for details about classification of causes, see a preceding paper (*1*)). Cases include those with prior onset that extended into the study year; attended cases include a few (0.4 percent) with all calls prior to the study year, and some hospital cases with no calls because all service was rendered in the hospital by the hospital staff.

Attended cases (disabling and nondisabling) include all attended by 1 or more practitioners, that is, physician, specialist, hospital, clinic, dentist (see notes to table 1), chiropodist, osteopath, chiropractor, midwife, or other healer. Cases attended by nurse alone are not counted as attended in this study because her work is usually supervised by some other practitioner primarily responsible for the case.

[2] For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).

[3] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

[4] Rates in the form of cases or calls per 1,000 population are adjusted by the direct method to the age distribution of the white population of the death registration States in 1930 as a standard population; this population is given for specific ages in table 1 of a preceding paper (*4*). The adjustment method involves the weighting of the age specific rates for the canvassed population according to the age distribution of the standard population. The details of the process are given under the heading of "corrected death rates" in Pearl (*17*), pp. 269–271.

[5] Rates plotted in figures 7 and 8 as 15–24: Skin, male 35.1, female 33.1. Rates plotted as 55 and over: Other respiratory, male 33.0, female 36.6; ear and mastoid, male 16.9, female 8.9; skin, male 14.5, female 22.8.

TABLE 5.—*Illnesses from certain causes attended by any practitioner per 1,000 population of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*—Continued

Sex and diagnosis group with International List numbers, 1920 revision	All ages: Number of attended cases	All ages: Adjusted	All ages: Crude	Age: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Cases attended by any practitioner per 1,000 population during year											
Degenerative diseases (43–50, 57, 74, 75, 83, 87–92, pt. 93, pt. 96, 128, 129, 130, pt. 131, 132, pt. 133, 135):													
Both sexes	1,161	40.9	30.1	7.4	10.3	9.2	14.1	12.7	26.1	40.1	57.6	94.4	228.5
Male	435	32.6	23.0	7.5	9.9	8.8	9.8	7.8	14.2	27.5	36.9	75.9	226.5
Female	726	49.3	37.0	7.5	10.7	10.1	18.4	16.3	34.9	52.9	83.0	116.6	229.9
Skin diseases (151–154, pt. 205):													
Both sexes	1,146	28.4	29.7	37.2	33.4	34.2	40.3	25.0	25.0	23.4	26.3	14.3	25.1
Male	555	27.7	29.4	38.8	33.0	29.1	41.3	24.6	26.6	24.8	23.8	12.4	18.3
Female	591	29.1	30.1	35.8	33.9	39.3	39.4	25.3	23.8	22.0	29.2	16.4	30.3
Female genital and puerperal diagnoses (137–150):													
Both sexes	1,491	43.4	38.7	.9	.7	2.0	21.0	117.0	126.8	60.9	20.6	6.1	4.0
Female	1,491	79.6	76.0	1.9	1.4	4.0	42.0	202.4	220.8	122.3	45.8	13.5	7.1
Accidental injuries (pt. 85, 165–203):													
Both sexes	2,595	66.0	67.3	66.0	77.7	74.9	69.2	58.0	62.2	66.1	60.3	58.4	67.1
Male	1,602	81.7	84.8	79.4	103.5	100.8	96.9	85.0	79.1	81.6	66.1	57.2	52.6
Female	993	51.2	50.6	52.5	52.5	48.5	41.4	38.4	49.7	50.5	53.1	59.8	78.4
All other diseases (53–56, 58–69, pt. 85, pt. 93, 94, 95, pt. 96, pt. 108, pt. 131, pt. 133, 134, 136, 155–157, pt. 158, 159–164, 204, pt. 205):													
Both sexes	2,849	73.8	73.9	102.3	53.7	48.4	50.2	60.4	79.4	82.6	91.3	86.2	79.2
Male	1,139	56.8	60.3	107.5	51.4	42.6	41.3	28.0	52.5	59.1	61.8	63.4	66.4
Female	1,706	89.8	86.9	96.1	56.0	54.3	59.1	84.1	99.4	106.4	127.5	113.6	89.1

TABLE 6.—*Illnesses from certain causes attended (in home or office) by private general [1] physicians per 1,000 population of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

[Sole or primary diagnoses only]

Sex and diagnosis [2] group	All ages [3]: Number of cases attended by physicians	All ages [3]: Adjusted [4]	All ages [3]: Crude	Age: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Cases attended by private general [1] physicians per 1,000 population during year											
Minor respiratory diseases:													
Both sexes	6,314	154.1	163.8	293.3	174.8	116.5	99.7	126.5	163.8	143.3	139.4	136.5	141.3
Male	2,950	142.8	156.1	303.4	170.6	110.4	98.9	92.8	149.9	130.2	124.7	124.4	109.8
Female	3,362	164.4	171.3	234.3	178.9	122.6	100.5	151.0	174.2	156.6	157.4	151.0	165.8
Other respiratory diseases:													
Both sexes	1,269	31.4	32.9	40.8	47.2	29.3	28.2	34.9	31.7	25.8	21.5	25.8	31.1
Male	598	29.7	31.6	42.0	50.0	26.9	28.2	32.4	27.9	23.5	17.9	33.6	16.0
Female	670	32.7	34.1	39.5	44.6	31.8	28.2	36.7	34.6	28.1	25.9	16.4	42.8
Minor digestive diseases:													
Both sexes	1,534	37.8	39.8	89.4	33.2	19.9	19.7	23.6	28.7	36.8	41.5	49.6	50.1
Male	710	34.4	37.6	89.0	32.6	21.3	13.1	14.5	27.1	31.6	37.4	46.0	43.5
Female	824	41.1	42.0	90.5	33.9	18.5	26.3	30.2	30.0	42.0	46.5	53.8	55.3
Other digestive diseases:													
Both sexes	827	23.2	21.5	14.7	12.6	12.7	19.7	30.2	29.6	26.8	29.2	23.1	30.1
Male	344	19.4	18.2	14.2	12.8	12.2	15.1	20.1	30.8	18.5	25.5	14.9	22.9
Female	483	26.9	24.6	15.3	12.4	13.2	24.3	37.5	28.7	35.2	33.9	32.9	35.7
Communicable diseases:													
Both sexes	2,219	44.2	57.6	136.4	141.6	55.2	22.0	18.4	20.6	17.2	15.5	11.5	9.0
Male	1,092	43.5	57.8	133.5	143.3	53.9	24.9	15.7	20.4	13.1	19.5	11.2	4.6
Female	1,127	44.7	57.4	140.5	139.9	56.5	19.0	20.4	20.7	21.3	10.6	12.0	12.5
Ear and mastoid diseases:													
Both sexes	428	9.6	11.1	25.8	16.3	10.3	5.9	6.6	7.6	5.4	6.3	8.8	5.0
Male	214	9.5	11.3	31.0	14.9	10.4	6.5	5.6	5.8	4.4	3.8	11.2	6.9
Female	214	9.7	10.9	20.5	17.6	10.1	5.3	7.3	9.0	6.4	9.3	6.0	3.6
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis:													
Both sexes	359	10.3	9.3	6.2	4.9	3.7	7.2	11.8	14.5	12.3	11.9	17.0	12.0
Male	96	5.1	5.1	7.1	5.3	3.5	6.5	1.1	3.7	4.4	4.9	8.7	9.2
Female	263	15.1	13.4	5.2	4.5	4.0	7.9	19.6	22.5	20.3	20.6	26.9	14.3
Rheumatism and related diseases:													
Both sexes	556	17.6	14.4	.4	3.3	3.3	3.6	3.8	19.0	26.0	35.8	51.6	36.1
Male	246	15.6	13.0	.4	4.3	3.0	3.9	2.2	15.0	23.8	30.4	48.5	32.0
Female	310	19.5	15.8	.4	2.4	3.5	3.3	4.9	21.9	28.1	42.5	55.3	39.2
Degenerative diseases:													
Both sexes	1,008	36.0	26.2	6.3	7.5	7.2	11.8	10.9	23.2	34.6	50.1	80.8	212.4
Male	374	28.6	19.8	6.1	8.5	7.0	7.9	6.7	13.3	22.5	29.8	64.7	210.5
Female	634	43.6	32.3	6.7	6.6	7.5	15.8	13.9	30.6	46.8	75.0	100.1	213.9
Skin diseases:													
Both sexes	947	23.5	24.6	29.9	28.5	27.6	34.1	19.3	20.6	20.1	20.6	13.6	21.0
Male	469	23.7	24.8	30.6	27.3	26.1	36.0	20.1	24.1	21.5	18.4	12.4	16.0
Female	478	23.5	24.4	29.4	29.7	29.1	32.2	18.8	17.9	18.6	23.2	14.9	25.0
Female genital and puerperal diagnoses:													
Both sexes	1,260	36.7	32.7	.4	.3	2.0	18.4	99.6	107.3	50.9	17.6	4.8	4.0
Female	1,260	67.4	64.2	.7	.7	4.0	36.8	172.2	186.8	102.3	39.2	10.5	7.1
Accidental injuries:													
Both sexes	2,243	57.1	58.2	57.0	67.4	64.6	59.0	50.5	55.9	54.8	52.8	49.6	60.1
Male	1,392	70.9	73.7	69.8	90.4	87.8	85.1	73.8	69.5	68.1	58.5	49.8	43.5
Female	851	44.0	43.4	44.0	44.9	41.0	32.8	33.5	45.7	41.3	45.8	49.3	73.1
All other diseases:													
Both sexes	1,741	44.3	45.2	75.3	33.9	27.1	32.1	37.3	47.3	44.9	48.9	49.6	48.1
Male	712	34.9	37.7	82.3	30.1	24.8	24.9	12.3	29.1	32.6	31.7	47.3	41.2
Female	1,027	52.7	52.3	67.8	37.7	29.6	39.4	55.5	60.8	57.3	66.4	52.3	53.5

[1] Physicians (M. D.) not designated by family informants as specialists; attendance may have been in office, home, or upon a private patient in a hospital.
[2] For International List numbers, see table 5. For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).
[3] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.
[4] Rates adjusted by the direct method as described in note to table 5.

TABLE 7.—*Illnesses from certain causes attended at home*[1] *by private general physicians per 1,000 population of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

[Sole or primary diagnoses only]

Sex and diagnosis[2] group	All ages[3]			Age									
	Number of cases with home calls	Adjusted[4]	Crude	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Cases with home calls[1] by physician per 1,000 population during year											
Minor respiratory diseases:													
Both sexes	4,348	104.2	112.8	222.7	131.6	82.1	59.0	80.7	104.6	87.4	86.8	85.5	111.2
Male	2,008	94.6	106.3	230.1	130.1	80.8	58.3	61.5	89.9	72.5	73.7	75.9	80.1
Female	2,339	113.0	119.2	216.5	133.0	83.4	59.8	94.7	115.5	102.3	102.9	97.2	135.5
Other respiratory diseases:													
Both sexes	674	16.6	17.5	29.6	25.5	12.0	14.4	16.5	14.2	11.3	11.0	14.9	23.0
Male	309	15.0	16.4	30.6	25.2	12.6	13.8	11.2	10.8	9.4	8.7	18.7	16.0
Female	364	17.8	18.5	28.3	25.9	11.5	15.1	20.4	16.7	13.2	13.9	10.5	28.5
Minor digestive diseases:													
Both sexes	847	20.0	22.0	58.8	22.0	12.0	11.1	9.4	12.1	14.2	17.6	25.8	32.1
Male	357	16.2	18.9	55.2	20.6	12.2	7.2	6.7	7.9	10.1	13.0	19.9	20.6
Female	490	23.8	25.0	63.0	23.5	11.9	15.1	11.4	15.1	18.3	23.2	32.9	41.0
Other digestive diseases:													
Both sexes	452	12.9	11.7	7.1	8.0	8.1	11.8	16.0	16.3	12.5	14.6	14.3	23.0
Male	169	9.4	8.9	7.8	8.9	7.0	8.5	7.8	12.5	7.1	11.9	7.5	16.0
Female	283	16.2	14.4	6.3	7.3	9.3	15.1	22.0	19.1	18.0	17.9	22.4	28.5
Communicable diseases:													
Both sexes	1,748	33.9	45.4	112.6	117.6	43.3	14.8	11.3	13.3	11.1	9.3	5.4	5.0
Male	850	32.7	45.0	108.6	117.7	43.9	17.7	5.6	11.7	8.1	13.0	3.7	----
Female	898	34.9	45.8	117.7	117.4	42.8	11.8	15.5	14.5	14.2	4.6	7.5	8.9
Ear and mastoid diseases:													
Both sexes	213	4.3	5.5	17.4	10.1	3.9	1.3	2.8	1.8	1.7	2.4	2.0	----
Male	112	4.2	5.9	22.8	8.5	4.3	2.0	1.1	.4	2.0	1.1	1.2	----
Female	101	4.3	5.1	11.9	11.7	3.5	.7	4.1	2.8	1.4	4.0	3.0	----
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis:													
Both sexes	182	5.3	4.7	5.3	2.1	1.3	3.9	5.7	6.0	4.9	6.0	12.2	9.0
Male	55	3.1	2.9	6.4	2.1	1.3	4.6	1.1	.8	1.0	2.7	7.5	9.2
Female	127	7.4	6.5	4.1	2.1	1.3	3.3	9.0	9.9	8.8	10.0	17.9	8.9
Rheumatism and related diseases:													
Both sexes	280	8.9	7.3	.2	3.0	2.4	2.0	2.4	9.2	12.3	17.0	23.8	21.0
Male	114	7.1	6.0	.4	3.9	2.6	2.6	1.1	6.2	9.4	14.6	17.4	16.0
Female	166	10.6	8.5	----	2.1	2.2	1.3	3.3	11.4	15.2	19.9	31.4	25.0
Degenerative diseases:													
Both sexes	488	19.2	12.7	2.2	2.3	3.1	4.6	5.7	9.6	13.2	23.3	38.7	154.3
Male	172	14.5	9.1	2.1	2.5	2.6	1.3	2.2	5.4	9.1	13.6	29.9	135.0
Female	316	23.7	16.1	2.2	2.1	3.5	7.9	8.2	12.7	17.3	35.2	49.3	169.3
Skin diseases:													
Both sexes	207	5.1	5.4	9.1	5.8	3.9	7.5	2.4	4.4	3.7	5.1	4.1	7.0
Male	105	5.2	5.6	9.6	6.0	5.6	6.5	2.2	5.4	3.4	3.8	3.7	6.9
Female	102	5.1	5.2	8.6	5.5	2.2	8.5	2.4	3.7	4.1	6.6	4.5	7.1
Female genital and puerperal diagnoses:													
Both sexes	841	24.5	21.8	.2	.2	.7	11.5	68.0	73.4	33.9	9.8	2.7	3.0
Female	841	44.8	42.8	.4	.3	1.3	23.0	117.6	127.9	68.1	21.9	6.0	5.3
Accidental injuries:													
Both sexes	876	22.8	22.7	26.3	26.1	20.8	18.0	17.9	20.2	21.1	20.9	26.5	40.1
Male	477	24.2	25.2	31.0	31.9	23.9	26.2	23.5	20.8	22.5	20.1	21.1	22.9
Female	399	21.5	20.3	21.6	20.4	17.6	9.8	18.9	19.8	19.7	21.9	32.9	53.5
All other diseases:													
Both sexes	671	16.4	17.4	41.4	14.0	8.1	7.9	8.5	14.7	15.0	16.4	17.7	27.1
Male	273	12.1	14.4	46.7	11.3	7.8	4.6	3.4	5.0	9.4	13.6	11.2	16.0
Female	396	20.1	20.2	35.4	16.6	8.4	11.2	12.2	21.9	20.7	19.9	25.4	35.7

[1] Including all cases (disabling and nondisabling) with 1 or more calls to the home of the patient by private physicians (M. D.) not designated by family informants as specialists.

[2] For International List numbers, see table 5. For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).

[3] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

[4] Rates adjusted by the direct method as described in note to table 5.

TABLE 8.—*Calls by any practitioner*[1] *in connection with illness from certain causes per 1,000 population of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31.*

[Sole or primary diagnoses only]

Sex and diagnosis[2] group	All ages[3]			Age[5]									
	Number of calls	Adjusted[4]	Crude	Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Annual calls[1] by any practitioner per 1,000 population											
Minor respiratory diseases:													
Both sexes	17, 658	446	458	750	452	297	274	343	496	415	428	489	551
Male	8, 186	410	433	752	445	297	292	310	488	378	317	511	263
Female	9, 468	479	482	753	460	297	255	367	502	452	564	463	775
Other respiratory diseases:													
Both sexes	11, 548	296	300	286	422	230	235	296	298	280	292	308	332
Male	5, 522	288	292	326	402	216	243	255	243	243	326	359	192
Female	6, 021	300	307	244	441	244	227	254	339	316	250	245	440
Minor digestive diseases:													
Both sexes	4, 222	108	110	231	59	44	35	68	74	147	141	152	163
Male	1, 659	81	88	217	53	33	18	21	69	102	92	78	158
Female	2, 563	136	131	246	64	55	53	103	77	193	201	241	168
Other digestive diseases:													
Both sexes	6, 315	189	164	47	51	90	134	235	242	234	234	384	266
Male	2, 732	168	145	45	50	68	111	130	264	190	225	327	275
Female	3, 583	210	183	50	53	112	156	312	226	278	244	453	258
Communicable diseases:													
Both sexes	9, 058	197	235	466	436	241	112	138	157	130	119	80	62
Male	4, 504	197	238	447	476	236	147	104	154	92	148	114	39
Female	4, 554	194	232	490	397	247	77	163	159	169	84	39	80
Ear and mastoid diseases:													
Both sexes	2, 977	69	77	138	112	54	59	39	51	84	38	74	42
Male	1, 529	72	81	152	95	70	69	23	34	103	24	104	69
Female	1, 448	65	74	124	129	38	49	51	63	64	56	37	21
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis:													
Both sexes	2, 491	71	65	38	30	43	44	35	95	78	130	109	106
Male	702	39	37	32	33	22	43	4	42	35	55	86	48
Female	1, 789	103	91	45	27	64	45	57	134	122	221	136	152
Rheumatism and related diseases:													
Both sexes	3, 901	123	101	1	22	29	14	49	111	189	239	445	178
Male	1, 794	111	95	1	24	43	14	8	79	209	202	444	119
Female	2, 107	132	107	1	20	15	14	78	135	168	284	447	225
Degenerative diseases:													
Both sexes	9, 411	350	244	30	46	58	121	75	154	343	534	726	2, 380
Male	3, 582	283	190	31	34	57	77	37	78	234	377	637	2, 238
Female	5, 829	417	297	29	57	59	166	102	211	453	726	834	2, 490
Skin diseases:													
Both sexes	4, 510	119	117	102	86	125	172	126	107	125	130	88	138
Male	2, 345	125	124	98	91	116	199	109	120	158	132	65	144
Female	2, 165	114	110	107	82	134	146	140	97	92	127	117	134
Female genital and puerperal diagnoses:													
Both sexes	11, 425	332	296	4	2	9	111	848	1, 016	467	166	37	70
Female	11, 425	608	582	9	5	19	223	1, 467	1, 770	938	369	81	125
Accidental injuries:													
Both sexes	11, 062	302	287	185	293	275	294	389	259	352	259	261	550
Male	7, 070	390	374	231	416	379	397	683	360	457	272	291	426
Female	3, 992	222	203	138	174	169	190	175	185	246	244	226	647
All other diseases:													
Both sexes	12, 785	346	332	347	189	215	213	273	359	404	570	376	532
Male	4, 766	244	252	327	221	174	162	85	213	299	392	213	355
Female	7, 988	442	407	358	159	256	264	410	468	509	788	573	670

[1] Includes calls (home, office, clinic) by any practitioner on all cases (disabling and nondisabling); that is, by physician, specialist, clinic, chiropodist, osteopath, chiropractor, midwife, or other healer, except dentist (see notes to table 1). Services to patients in hospitals by the hospital staff are not counted as calls, but calls by private physicians are counted. Calls by nurse are not counted as her work is usually supervised by some other practitioner primarily responsible for the case. Calls include those within the study year only, but the case may have had its onset prior to the study year or have been still sick at the end of the year. In computing total calls, cases with an unknown number of calls were put in at an average based on cases of the same diagnosis group with known numbers of calls, exclusive of the few cases with 100 or more calls.

[2] For International List numbers, see table 5. For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).

[3] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

[4] Rates adjusted by the direct method as described in note to table 5.

[5] Rates plotted in figures 7 and 8 as 15–24: Other respiratory, male 284, female 239; other digestive, male 118, female 226; nervous, male 29, female 51; skin, male 166, female 143; accidents, male 503, female 183. Rates plotted as 35–54: Ear and mastoid, male 73, female 61. Rates plotted as 55 and over: Minor respiratory, male 424, female 606; other respiratory, male 301, female 334; minor digestive, male 106, female 207; other digestive, male 309, female 364; communicable, male 88, female 58; ear and mastoid, male 92, female 30; skin, male 93, female 124.

TABLE 9.—*Calls by private general[1] physicians in connection with illness from certain causes per 1,000 population of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

[Sole or primary diagnoses only]

Sex and diagnosis[2] group	Number of calls by physicians	All ages[3]: Adjusted[4]	All ages[3]: Crude	Age: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Annual calls by private general[1] physicians per 1,000 population											
Minor respiratory diseases:													
Both sexes	14,942	378	388	618	392	269	243	284	407	348	369	402	496
Male	6,883	343	364	624	392	266	261	219	391	310	269	433	247
Female	8,055	409	410	616	392	272	225	331	419	386	491	365	690
Other respiratory diseases:													
Both sexes	7,041	185	183	192	244	143	152	214	175	149	146	227	295
Male	3,532	187	187	225	265	132	176	279	125	157	131	301	165
Female	3,507	181	179	159	224	154	129	167	212	140	164	138	396
Minor digestive diseases:													
Both sexes	3,306	86	86	176	51	35	35	57	60	106	100	130	150
Male	1,395	70	74	178	47	31	18	21	60	76	74	76	158
Female	1,911	102	97	175	55	38	53	83	59	136	132	196	144
Other digestive diseases:													
Both sexes	3,775	113	98	30	33	39	75	134	154	131	167	203	172
Male	1,669	101	88	27	37	30	81	64	187	92	164	206	82
Female	2,106	124	107	34	30	47	70	184	130	170	171	199	242
Communicable diseases:													
Both sexes	7,785	167	202	407	399	204	105	87	114	100	115	79	60
Male	3,894	167	206	391	438	215	138	64	83	72	141	114	34
Female	3,891	165	198	428	362	192	71	104	137	129	83	36	80
Ear and mastoid diseases:													
Both sexes	1,331	30	35	76	47	28	19	19	26	22	29	19	13
Male	624	27	33	86	40	40	20	8	10	20	15	24	23
Female	707	33	36	65	54	17	18	28	38	24	47	13	5
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis:													
Both sexes	1,568	46	41	24	19	18	32	32	58	55	69	80	73
Male	457	25	24	25	20	18	34	4	13	25	35	55	41
Female	1,111	65	57	23	19	18	31	52	91	85	111	111	98
Rheumatism and related diseases:													
Both sexes	2,415	76	63	1	19	19	11	41	79	109	139	248	130
Male	1,092	68	58	1	20	23	14	8	55	120	119	255	89
Female	1,323	83	67	1	17	15	9	64	97	97	163	241	162
Degenerative diseases:													
Both sexes	7,258	283	188	25	27	33	92	62	98	239	409	551	2,209
Male	2,941	240	156	23	28	35	62	34	57	207	279	464	2,101
Female	4,317	326	220	27	27	31	123	83	129	271	569	656	2,294
Skin diseases:													
Both sexes	3,201	86	83	70	64	86	106	105	76	88	99	65	113
Male	1,680	93	89	55	70	104	106	82	95	109	102	63	137
Female	1,521	80	78	86	58	68	105	122	62	66	94	67	94
Female genital and puerperal diagnoses:													
Both sexes	8,792	256	228	2	1	9	99	663	779	350	135	28	42
Female	8,792	469	448	4	1	19	199	1,147	1,356	703	301	61	75
Accidental injuries:													
Both sexes	8,808	241	229	152	240	228	214	319	216	256	219	190	458
Male	5,804	322	307	189	333	321	311	577	297	373	225	218	405
Female	3,004	167	153	114	149	133	117	131	155	139	210	157	499
All other diseases:													
Both sexes	6,257	168	162	196	102	87	120	158	184	165	267	202	203
Male	2,369	123	125	200	105	79	98	39	108	121	166	179	162
Female	3,874	210	197	187	100	95	142	244	241	209	390	229	235

[1] Physicians (M. D.) not designated by family informants as specialists; includes home and office calls and calls on private patients in hospitals. Calls include those within the study year only, but the case may have had its onset prior to the study year or have been still sick at the end of the year. In computing total calls, cases with an unknown number of calls were put in at an average based on cases of the same diagnosis group with known numbers of calls by general physicians, exclusive of the few cases with 100 or more calls.

[2] For International List numbers, see table 5. For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).

[3] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

[4] Rates adjusted by the direct method as described in note to table 5.

TABLE 10.—*Home calls* [1] *by private general physicians in connection with illness from certain causes per 1,000 population of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

(Sole or primary diagnoses only)

Sex and diagnosis [2] group	All ages [3]: Number of home calls	All ages [3]: Adjusted [4]	All ages [3]: Crude	Age [5]: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Annual home calls [1] by physicians per 1,000 population											
Minor respiratory diseases:													
Both sexes	10, 330	256. 4	268. 0	477. 4	300. 6	193. 1	133. 8	183. 6	260. 6	210. 1	244 7	203. 7	433 9
Male	4, 612	220. 1	244. 1	477. 2	309. 6	207. 7	133. 6	145. 4	221 1	174. 2	164 8	189. 1	183. 1
Female	5, 716	289. 6	291. 2	480. 6	291. 9	178. 2	133. 9	211. 4	290. 0	246. 4	342. 6	221. 2	629. 2
Other respiratory diseases:													
Both sexes	3, 869	100. 2	100. 4	147. 3	159 2	69. 4	87. 2	56. 6	69. 1	60. 0	71. 6	129. 0	260. 5
Male	1, 841	92. 0	97. 4	169. 9	166. 7	67. 8	87. 8	52. 6	34. 6	62. 8	41. 7	171. 6	164. 8
Female	2, 026	105. 9	103. 2	124. 1	152. 0	71. 0	86. 7	59. 6	94. 8	57. 3	108. 2	77. 7	335. 1
Minor digestive diseases:													
Both sexes	1, 627	39. 3	42. 2	115. 2	33. 2	20. 6	18. 7	14. 6	19. 5	38. 6	35. 8	41. 4	90 2
Male	666	31. 6	35. 2	112. 9	28. 0	19. 1	9. 2	11. 2	13. 3	21. 8	21. 7	28. 6	91. 5
Female	961	47. 4	49. 0	118. 5	38. 3	22. 1	28. 2	17. 1	24. 1	55. 6	53. 1	56. 8	89. 1
Other digestive diseases:													
Both sexes	1, 852	58. 4	48. 0	13. 2	22. 7	26. 3	46. 6	59. 0	66. 7	47. 6	74. 0	131. 7	147. 3
Male	748	46. 8	39. 6	12. 1	29. 1	16. 1	49. 8	19. 0	63. 7	23. 5	72. 1	153. 0	52. 6
Female	1, 104	67. 6	56. 2	14. 5	16. 6	36. 6	43. 3	88. 2	68. 9	71. 8	76. 4	106. 1	221. 0
Communicable diseases:													
Both sexes	5, 828	120. 4	151. 2	328. 1	322. 3	163. 5	78. 4	53. 8	65. 4	67. 8	63. 3	22. 4	42. 1
Male	2, 842	113. 1	150. 4	319. 1	355. 7	174. 7	104. 8	15. 7	35 4	34. 6	81. 8	17. 4	-----
Female	2, 986	125. 1	152. 1	340. 2	289. 8	152. 2	51. 9	81. 6	87. 7	101. 3	40. 5	28. 4	74. 9
Ear and mastoid diseases:													
Both sexes	597	12. 4	15. 5	46. 8	23. 4	13. 8	6. 6	12. 7	5. 3	5. 9	7. 5	3. 4	-----
Male	309	11. 9	16. 4	56. 6	20. 2	20. 4	11. 1	2. 2	. 8	5. 7	2. 7	3. 7	-----
Female	288	12. 5	14. 7	36. 9	26. 6	7. 1	2. 0	20. 4	8. 6	6. 1	13. 3	3. 0	-----
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis:													
Both sexes	734	22. 3	19. 0	15. 8	7. 7	8. 3	16. 4	12. 3	22. 2	20. 2	33. 4	54. 3	51. 1
Male	219	12. 9	11. 6	21. 7	6. 4	8. 3	20. 3	4. 5	1. 2	5. 0	10. 3	38. 6	41. 2
Female	515	31. 5	26. 2	9. 7	9. 0	8. 4	12. 5	18. 0	37. 7	35. 6	61. 8	73. 2	58. 8
Rheumatism and related diseases:													
Both sexes	1, 035	31. 7	26. 9	[illegible]. 4	15. 0	12. 0	4. 6	11. 3	33. 7	48. 7	54. 6	69. 9	79. 2
Male	491	28. 6	26 0	. 7	13. 1	15. 6	6. 5	6. 7	30. 0	65. 1	39. 0	49. 8	50. 3
Female	544	34. 8	27. 7	-----	16. 9	8. 4	2. 6	14. 7	36. 4	32. 2	73. 7	94. 2	101. 6
Degenerative diseases:													
Both sexes	3, 476	150. 4	90. 2	13. 4	8. 2	11. 2	23. 9	22. 2	41. 0	77. 9	148. 6	255. 9	1584.2
Male	1, 359	125. 5	71. 9	15. 0	12. 4	7. 8	3. 3	17. 9	22. 1	56. 7	92. 1	264. 9	1384.4
Female	2, 117	173. 3	107. 9	11. 9	4. 1	14. 6	44. 6	25. 3	55. 0	99. 3	217. 8	245. 1	1739.8
Skin diseases:													
Both sexes	587	16. 9	15. 2	16. 1	11. 0	12. 7	20. 0	3. 8	11. 3	10. 8	17. 9	27. 8	65. 1
Male	324	20. 7	17. 1	15. 3	11. 0	21. 3	17. 7	4. 5	11. 7	14. 1	13. 0	31. 1	116. 7
Female	263	13. 9	13. 4	17. 1	11. 1	4. 0	22. 3	3. 3	11. 1	7. 5	23. 9	23. 9	25. 0
Female genital and puerperal diagnoses:													
Both sexes	3, 894	112. 8	101. 0	. 7	. 2	. 7	45. 2	285. 5	337. 2	169. 3	59. 1	12. 9	14. 0
Female	3, 894	207. 3	198. 4	1. 5	. 3	1. 3	90. 6	493. 9	587. 4	340. 2	131. 5	28. 4	25. 0
Accidental injuries:													
Both sexes	2, 767	78. 8	71. 8	61. 1	79. 6	53. 4	48. 9	69. 4	60. 6	75. 2	71. 9	68. 6	292. 6
Male	1, 528	81. 3	80. 9	76. 2	108. 5	73. 0	67. 5	109. 6	65 4	95. 7	43. 4	65. 9	132. 7
Female	1, 239	76. 1	63. 1	45. 8	51. 5	33. 5	30. 2	40. 0	57. 1	54. 6	106. 9	71. 7	417. 1
All other diseases:													
Both sexes	1, 971	50. 4	51. 1	99. 8	45. 7	18. 8	31. 8	16. 5	45. 7	48 2	63. 9	41. 4	118. 2
Male	776	34. 2	41. 1	111. 1	60. 3	17. 8	20. 3	3. 4	10 4	24. 2	41. 2	33. 6	38. 9
Female	1, 182	64. 2	60. 2	83. 8	31. 4	19. 9	43. 3	26. 1	72 0	72. 5	91. 6	50. 8	180. 0

[1] Includes calls to the home of the patient on all cases (disabling and nondisabling) by private physicians (M. D.) not designated by family informants as specialists. Calls include those within the study year only, but the case may have had its onset prior to the study year or have been still sick at the end of the year. In computing total home calls, cases with an unknown number of home calls were put in at an average based on cases of the same diagnosis group with known numbers of home calls, exclusive of the few extreme cases with 100 or more calls.

[2] For International List numbers, see table 5. For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).

[3] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

[4] Rates adjusted by the direct method as described in note to table 5.

[5] Rates plotted in figures 7 and 8 as 5–14: Skin, male 15.6, female 7.9. Rates plotted as 15–24: Other digestive, male 38.4, female 63.3; ear and mastoid, male 7.8, female 10.2; nervous, male 14.5, female 14.9, skin, male 12.8, female 13.8; accidents, male 83.0, female 34.6. Rates plotted as 35–54: Ear and mastoid; male 4.6, female 8.5; rheumatism, male 55.1, female 46.2; accidents, male 75.7, female 72.2. Rates plotted as 55 and over: Minor respiratory, male 186.9, female 407.3; other respiratory, male 169.2, female 195.1; minor digestive, male 50.8, female 71.5; other digestive, male 117.6, female 158.5; communicable, male 11.3, female 49.6; ear and mastoid, male 2.4, female 1.6; skin, male 61.2, female 24.4.

Table 11.—*Calls by any practitioner per attended case* [1] *of certain diagnoses for persons of specific ages for each sex—8,758 canvassed white families in 18 States during 12 consecutive months, 1928–31*

(Sole or primary diagnoses only)

Sex and diagnosis [2] group	All ages [3]: Number of attended cases	All ages [3]: Adjusted [4]	All ages [3]: Crude	Age [5]: Under 5	5–9	10–14	15–19	20–24	25–34	35–44	45–54	55–64	65 and over
		Calls by any practitioner per attended case [1]											
Minor respiratory diseases:													
Both sexes	7,283	2.5	2.4	2.1	2.2	2.3	2.4	2.5	2.7	2.5	2.7	3.2	3.5
Male	3,406	2.5	2.4	2.0	2.3	2.3	2.7	3.1	2.9	2.5	2.3	3.7	2.2
Female	3,875	2.5	2.4	2.2	2.2	2.2	2.2	2.2	2.6	2.5	3.1	2.8	4.2
Other respiratory diseases:													
Both sexes	1,991	6.1	5.8	4.9	5.3	4.3	5.5	6.0	6.2	6.5	9.0	8.7	9.7
Male	943	6.2	5.9	5.5	4.8	4.3	5.7	7.7	5.6	6.1	10.9	9.0	9.3
Female	1,046	6.0	5.8	4.3	5.8	4.2	5.2	4.9	6.6	6.8	7.1	8.2	9.9
Minor digestive diseases:													
Both sexes	1,772	2.5	2.4	2.1	1.6	2.1	1.7	2.7	2.3	3.6	3.0	2.8	3.0
Male	813	2.1	2.0	2.0	1.4	1.4	1.3	1.5	2.2	3.0	2.3	1.5	3.3
Female	959	2.9	2.7	2.1	1.7	2.8	1.8	3.1	2.3	4.0	3.7	4.0	2.8
Other digestive diseases:													
Both sexes	945	7.2	6.7	2.8	3.7	5.9	5.7	7.2	7.6	7.4	7.1	12.9	8.0
Male	391	7.6	7.0	2.7	3.7	4.9	6.8	5.5	8.0	8.6	7.7	15.5	10.9
Female	554	6.9	6.5	2.8	3.7	6.7	5.2	8.0	7.3	6.8	6.6	11.2	6.6
Communicable diseases:													
Both sexes	2,496	4.0	3.6	3.0	2.7	3.8	4.6	6.8	6.9	6.9	7.3	6.9	6.9
Male	1,224	4.1	3.7	3.0	2.9	3.8	5.5	6.2	7.0	6.5	7.2	10.2	8.5
Female	1,272	3.9	3.6	3.1	2.5	3.8	3.6	7.1	6.9	7.1	7.5	3.3	6.4
Ear and mastoid diseases:													
Both sexes	676	4.5	4.4	3.5	4.4	3.6	5.3	4.0	4.6	8.3	4.1	4.7	4.7
Male	337	4.7	4.5	3.5	3.9	4.1	5.6	2.6	3.6	11.8	3.7	5.3	6.0
Female	339	4.3	4.3	3.4	4.7	2.9	4.9	4.8	5.2	5.6	4.4	3.6	3.0
Nervous diseases except cerebral hemorrhage, paralysis, neuralgia, and neuritis:													
Both sexes	465	5.4	5.4	4.9	4.7	6.8	4.6	2.8	5.3	4.8	7.7	5.3	7.1
Male	132	5.7	5.3	3.4	5.1	3.6	5.4	4.0	7.8	5.7	7.2	7.7	4.2
Female	333	5.4	5.4	7.2	4.3	9.7	4.1	2.8	4.9	4.5	7.9	4.3	8.5
Rheumatism and related diseases:													
Both sexes	699	5.5	5.6	3.0	5.5	7.8	3.3	10.3	4.8	5.7	5.3	6.6	4.0
Male	307	5.7	5.8	2.0	4.9	10.9	3.7	3.5	4.2	7.2	5.1	7.0	3.1
Female	392	5.3	5.4	4.0	6.6	4.3	3.0	12.0	5.1	4.5	5.4	6.1	4.7
Degenerative diseases:													
Both sexes	1,161	8.6	8.1	4.0	4.4	6.3	8.6	5.9	5.9	8.5	9.3	7.7	10.4
Male	435	8.7	8.2	4.1	3.4	6.9	7.8	4.7	5.5	8.5	10.2	8.4	9.9
Female	726	8.5	8.0	3.9	5.3	5.8	9.0	6.3	6.0	8.6	8.8	7.2	10.8
Skin diseases:													
Both sexes	1,146	4.2	3.9	2.7	2.6	3.7	4.3	5.1	4.3	5.3	4.9	6.2	5.5
Male	555	4.5	4.2	2.5	2.8	4.0	4.8	4.4	4.5	6.4	5.5	5.2	7.9
Female	591	3.9	3.7	3.0	2.4	3.4	3.7	5.5	4.1	4.2	4.3	7.1	4.4
Female genital and puerperal diagnoses:													
Female	1,491	7.6	7.7	4.6	3.5	4.7	5.3	7.2	8.0	7.7	8.1	6.0	17.5
Accidental injuries:													
Both sexes	2,595	4.6	4.3	2.8	3.8	3.7	4.2	6.7	4.2	5.3	4.3	4.5	8.2
Male	1,602	4.8	4.4	2.9	4.0	3.8	4.1	8.0	4.5	5.6	4.1	5.1	8.1
Female	993	4.3	4.0	2.6	3.3	3.5	4.6	4.5	3.7	4.9	4.6	3.8	8.3
All other diseases:													
Both sexes	2,849	4.7	4.5	3.4	3.5	4.4	4.2	4.5	4.5	4.9	6.2	4.4	6.7
Male	1,139	4.3	4.2	3.0	4.3	4.1	3.9	3.0	4.1	5.1	6.3	3.3	5.3
Female	1,706	4.9	4.7	3.7	2.8	4.7	4.5	4.9	4.7	4.8	6.2	5.0	7.5

[1] Average calls during study year per attended case as shown in this table is computed from calls as defined in table 8 and attended cases as defined in table 5.

[2] For International List numbers, see table 5. For further details about specific diseases included in each broad group, see figure 1 and table 2 of preceding paper (*15*).

[3] "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

[4] Figures in the "adjusted" column represent the result of dividing the adjusted rate for calls per 1,000 (table 8) by the adjusted rate for attended cases per 1,000 (table 5).

[5] Rates plotted in figures 7 and 8 as under 15: Nervous, male 4.0, female 6.9. Rates plotted as 5–14: Rheumatism, male 7.2, female 5.5. Rates plotted as 15–24: Other respiratory, male 6.5, female 5.1; minor digestive, male 1.4, female 2.4; other digestive, male 6.2, female 6.6; ear and mastoid, male 4.7, female 4.9; nervous, male 5.3, female 3.3; rheumatism, male 3.6, female 7.8; skin, male 4.7, female 4.3; accidents, male 5.4, female 4.6. Rates plotted as 35–54: Other respiratory, male 7.6, female 6.9; ear and mastoid, male 9.3, female 5.2. Rates plotted as 45 and over: Communicable, male 7.8, female 6.2. Rates plotted as 55 and over: Minor respiratory, male 3.2, female 3.4; other respiratory, male 9.1, female 9.1; minor digestive, male 2.1, female 3.5; other digestive, male 13.7, female 9.1; ear and mastoid, male 5.4, female 3.4; nervous, male 6.4, female 5.7; skin, male 6.4, female 5.5.

PROVISIONAL MORTALITY RATES FOR THE FIRST HALF OF 1940

The mortality rates in this report are based upon preliminary data from 31 States, the District of Columbia, Hawaii, and Alaska for the first 6 months of 1940. Comparative data for the first 6 months of 1938 and 1939 are presented for 30 States and the District of Columbia. This report is made possible through a cooperative arrangement with the respective States which voluntarily furnish provisional monthly tabulations of current birth and death statistics to the United States Public Health Service which analyzes and publishes the data. Because of lack of uniformity in the method of classifying deaths according to cause as well as some delay in filing certificates, these data are

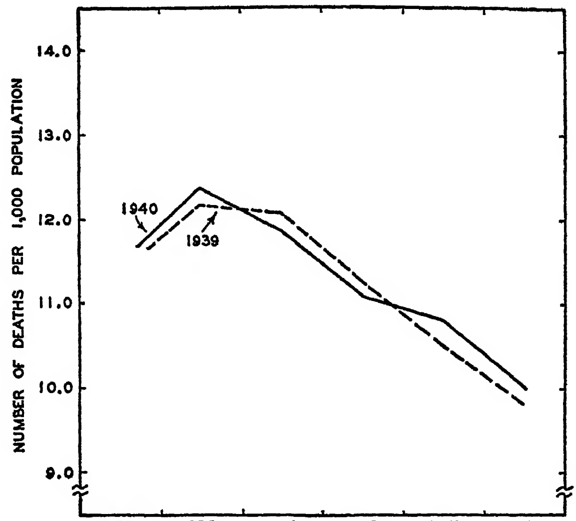

FIGURE 1.—Death rates per 1,000 population, by months, 1939 and 1940

preliminary and may differ in some instances from the final figures subsequently published by the Bureau of the Census.

In the past, however, these preliminary reports have accurately reflected the trend in mortality rates for the country as a whole. Some deviation from the final figures, especially those for specific causes of death, for individual States may be expected because of the provisional nature of the information. Nevertheless, it is believed that the trend in mortality within each State is correctly represented. Comparisons of specific causes of death for different States are subject to error because of variations in tabulation procedure and promptness of filing the original certificates. Such comparisons should be based upon the final figures published by the Bureau of the Census.

The mortality rate from all causes per 1,000 population for the first half of 1940 was slightly higher than the corresponding rate for the two previous years, 11.3 compared with 11.2 and 11.0. During the current year the death rate has been higher than last year for 4 of the first 6 months (fig. 1). The slight rise results from increases in the chronic diseases of late adult life, since none of the acute diseases for which data are shown in the following tables has a rate higher than that reported during the 2 previous years.

In addition to increases in the mortality rates of chronic diseases, cancer, diabetes, cerebral hemorrhage, heart disorders and nephritis, there was a 4-percent increase in the death rate from accidents. The decrease in the relative number of fatal automobile accidents has apparently been replaced by an increase; the rate for the first half of 1940 was 7.8 percent above that in 1939. The increase was fairly widespread; 23 of the 32 reporting areas experienced a higher rate in 1940 than in the previous year.

The current period has been unusually free from outbreaks of the principal communicable diseases of childhood and adolescence, diphtheria, measles, scarlet fever, and whooping cough. The death rate from these diseases is one-third less than the corresponding rate in 1939 and nearly two-thirds less than the rate in 1938. The mortality rate from tuberculosis also maintained its downward trend and has been below 50 per 100,000 population for the entire 6 months.

Especially gratifying is the continued decline in the infant and maternal mortality rates. The number of infant deaths per 1,000 live births for the current period, 49, was nearly 6 percent lower than the rate for 1939, while the maternal mortality rate, 4.1 per 1,000 live births, was slightly over 2 percent less than last year.

The birth rate increased from 16.4 per 1,000 population in 1939 to 16.8 in 1940. The crude rate of natural increase, 5.5 per 1,000 population, was also slightly greater than for the first 6 months of 1939.

Provisional mortality from certain causes in the first 6 months of 1940, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths), per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																			
			Total infant mortality	Maternal mortality	Typhoid fever (1-2)	Cerebrospinal (meningococcus) meningitis (6)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Tuberculosis, all forms (13-22)	Influenza (grippe) (33)	Measles (35)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90-95)	Pneumonia, all forms (107-109)	Diseases of the digestive system (115-129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170a, b, e)
31 STATES [1]																								
January-June:																								
1940	11.3	16.8	49	4.1	0.6	0.6	0.7	2.0	1.0	49.6	22.3	0.4	0.2	0.5	120.1	28.4	97.1	318.9	69.9	53.5	3.8	83.0	67.5	20.8
1939	11.2	16.4	52	4.2	.9	.6	.8	2.6	1.3	50.5	24.7	1.5	.2	.4	116.6	27.2	91.5	299.4	81.7	57.1	5.4	80 1	64 9	19.3
1938	11.0	16.8	53	4.6	1.0	1.0	1.1	4.1	1.6	52.3	15.6	4.5	.3	.5	113.8	24.7	86.1	276.9	84.3	61.6	8.0	81.3	64.3	20.3
January-March:																								
1940	12.0	16.4	53	4.2	.5	.6	.9	2.0	1.4	49.2	33.9	.4	.3	.4	121.1	31.2	103.6	341.6	90.2	53.4	4.6	87.9	68.2	19 7
1939	11.8	16.1	56	4.4	.9	.7	1.1	2.7	1.8	49.9	33.0	1.6	.1	.5	117.0	28.7	96.3	321.6	109.5	55.2	4.1	84.5	63.3	19.1
1938	11.4	16.6	54	4.7	.8	1.3	1.3	3.7	2.0	51.4	22.6	4.2	.3	.5	113.0	25.8	89.0	287.4	106.9	55.4	4.2	83.1	63.9	20.6
April-June:																								
1940	10.6	17.1	45	4.0	.8	.5	.5	2.1	.6	49.9	10.7	.5	.2	.6	119.0	25.6	90.5	296.3	49 6	53.6	3.1	78.0	66.8	21.9
1939	10.5	16.5	48	4.1	.9	.5	.6	2.6	.8	51.1	16.5	1.3	.3	.4	116.1	25.6	86.7	277.5	54 3	59.0	6.7	75.7	66 6	19.6
1938	10.6	17.0	51	4.6	1.3	.8	.9	4.5	1.1	53.1	8.8	4.7	.3	.5	114.6	23.6	83.2	266.4	61.8	67.6	11.8	79.5	64.7	20.1
Metropolitan Life Insurance Co., industrial policyholders, (January-June): [2]																								
1940	8.1	------	------	------	.4	------	.7	1.3	.9	46.6	11.9	.4	------	------	103 0	31.5	64.3	[3] 227.2	47.4	------	[4] 4.8	[5] 61.3	54.5	[6] 14.4
1939	8.2	------	------	------	.5	------	1.0	1.9	1.2	47.4	15.6	1.0	------	------	100.6	29.1	63.5	[3] 223.4	60.5	------	[4] 5.7	[5] 55.1	56 9	[6] 15.5
1938	8.1	------	------	------	.8	------	1.7	2.2	1.7	49.0	9.9	2.9	------	------	96.1	26.2	61.1	[3] 204.2	66.0	------	[4] 5.9	[5] 56.1	45.1	[6] 16.2
Alaska:																								
1940	20.5	26.6	140	2.7	(7)	(7)	(7)	44.5	8.3	447.7	8.3	250.2	(7)	(7)	80.6	(7)	94.5	236.3	178.0	19.5	5.6	16.7	139 0	(7)
1939	15.2	21.6	76	2.6	(7)	(7)	17.0	31.2	2.8	349.2	28.4	(7)	(7)	2.8	76.7	5.7	65.3	201.6	142.0	92.6	(7)	28 1	130 6	(7)
1938	21.7	29.7	83	(7)	2.9	(7)	2.9	86.8	(7)	526.4	60.7	2.9	(7)	(7)	86.8	(7)	164.9	228.5	257.4	43.4	(7)	14.5	205.4	(7)
Colorado:																								
1940	11.2	19.3	51	3.4	.7	.5	.5	2.7	1.6	52.0	16.1	2 0	1.1	.4	121.8	17.9	89 0	269.8	86.8	63.0	2.2	77.5	78.6	23.7
1939	11.8	18.3	50	5.7	1.1	.9	1.5	7.1	3.1	59.8	31.0	2.2	.5	.4	114.7	17.4	92.6	251.0	110.7	63 3	4.5	83.9	77 8	21.2
1938	11.6	18.2	53	3.5	1.3	.7	1.3	2.9	3.8	65.4	17.2	4.9	.7	.7	116.0	18.3	88.6	239.8	114.0	72.1	6.4	85.5	78.5	25.4

See footnotes at end of table.

Provisional mortality from certain causes in the first 6 months of 1940, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths), per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid fever (1–2)	Cerebrospinal (meningococcus) meningitis (6)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Tuberculosis, all forms (13–22)	Influenza (grippe) (33)	Measles (35)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90–95)	Pneumonia, all forms (107–109)	Diseases of the digestive system (115–129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–195)	Automobile accidents (170a, b, e)
31 STATES—continued																								
Connecticut:																								
1940	10.7	12.4	42	3.0	.1	.5	(7)	.3	.2	34.6	6.6	.2	(7)	.2	148.5	22.1	119.3	331.2	55.9	45.1	1.8	66.1	55.5	16.4
1939	10.7	13.1	39	3.4	.2	(7)	.4	1.5	.6	40.2	8.3	.8	(7)	.1	140.7	31.3	90.9	289.7	64.2	50.6	1.9	84.7	57.0	16.5
1938	10.8	13.6	36	2.5	.2	.2	.5	.6	1.0	39.1	5.2	(7)	(7)	.2	141.3	32.9	94.5	270.1	69.0	52.4	2.7	89.9	61.1	17.3
Delaware:																								
1940	12.8	16.4	56	5.5	(7)	.8	2.3	3.0	(7)	50.8	18.2	(7)	(7)	(7)	144.0	33.4	110.7	380.6	72.8	47.0	4.5	138.0	56.1	21.2
1939	13.1	16.0	49	4.8	(7)	2.3	.8	2.3	1.5	64.5	17.7	(7)	(7)	2.3	123.0	36.9	122.9	412.3	102.1	47.6	3.8	121.3	63.0	23.8
1938	12.7	15.8	53	3.9	.8	.8	.8	8.5	1.6	44.2	16.3	1.6	(7)	(7)	128.0	31.8	111.7	387.0	98.5	58.2	6.2	121.0	73.7	24.8
District of Columbia:																								
1940	13.6	21.2	48	2.0	.6	.9	.3	1.8	.3	67.2	11.7	(7)	.6	(7)	151.2	33.7	100.6	361.8	98.8	81.3	7.5	133.8	64.2	19.9
1939	13.2	20.8	44	5.5	.3	.9	(7)	1.9	.6	69.8	14.0	.6	(7)	.3	156.7	26.4	81.9	356.8	84.4	72.3	5.6	114.5	76.0	20.2
1938	13.1	19.8	49	5.3	.3	2.6	1.0	.6	1.0	75.3	6.4	.6	(7)	1.0	137.8	22.6	88.0	355.0	109.4	69.8	7.7	112.6	67.3	19.1
Florida:																								
1940	13.3	15.6	60	7.8	1.1	.4	.1	2.0	1.0	55.5	45.3	.6	.2	.4	99.9	21.1	126.1	338.7	70.0	73.2	7.0	97.2	100.4	39.3
1939	11.9	15.3	65	6.3	1.5	.5	.3	3.9	1.4	52.3	32.4	1.2	.1	.2	95.6	21.8	98.6	258.2	60.9	79.6	12.7	96.9	95.7	38.1
1938	12.1	15.1	62	7.8	3.2	1.0	.1	4.1	1.8	55.3	27.8	2.3	.3	.6	89.2	19.4	99.6	256.5	75.0	89.2	14.6	94.8	93.2	39.7
Georgia:																								
1940	10.3	19.0	61	5.4	.7	.5	.5	2.8	1.5	49.7	47.9	1.0	.3	.1	59.5	11.3	98.1	198.8	83.8	36.0	6.2	103.4	59.3	20.1
1939	9.7	18.4	67	6.1	1.4	.4	.3	4.4	1.3	44.6	40.7	2.9	.3	.1	56.6	12.0	90.1	163.1	83.9	54.0	12.1	91.2	52.8	18.5
1938	10.7	19.1	73	6.7	2.2	1.0	.5	7.1	1.6	52.7	33.6	8.0	.4	.3	56.8	13.5	86.4	167.1	102.2	70.6	20.6	109.7	64.0	23.4
Hawaii:																								
1940	7.3	22.2	49	2.3	2.8	.5	(7)	2.4	2.4	63.9	6.2	(7)	1.9	(7)	67.2	15.6	43.6	116.5	48.3	47.4	6.6	62.0	52.1	11.8
1939	8.0	20.1	62	3.3	1.9	(7)	(7)	7.6	1.4	69.3	5.8	(7)	(7)	.5	66.4	18.8	45.7	133.7	67.8	54.8	11.1	73.6	51.0	13.5
1938	8.1	22.2	58	2.9	1.5	1.0	.5	6.3	1.0	67.8	4.9	.5	1.0	.5	67.8	17.5	57.0	123.8	68.7	59.5	18.0	67.3	59.0	14.1

Idaho:																							
1940	9.3	22.2	36	4.0	.4	1.5	1.1	1.5	.4	21.1	17.2	1.5	(7)	1.5	88.8	16.8	63.5	242.3	39.4	55.1	3.8	58.6	87.3	27.6
1939	9.6	21.6	48	2.7	2.7	1.9	.8	2.3	.8	20.7	21.8	1.6	.4	1.2	92.3	24.5	65.5	258.7	74.0	54.9	2.7	50.7	83.4	25.3
1938	9.1	21.8	43	3.6	2.4	2.0	.8	1.4	(7)	22.2	20.2	1.2	1.6	2.0	75.6	13.8	71.6	177.2	90.2	57.8	1.6	53.8	71.6	26.5
Illinois:																							
1940	11.8	14.5	37	3.0	.4	.2	1.4	.7	1.3	48.1	12.8	.2	(8)	.3	140.7	36.1	87.9	378.2	58.8	59.5	1.6	97.7	67.6	25.7
1939	11.8	14.3	42	3.3	.2	.2	1.4	2.4	1.7	50.0	21.6	.1	.2	.2	141.3	31.6	79.0	367.6	71.9	61.0	2.3	103.0	63.9	23.2
1938	11.1	14.7	43	3.4	.4	.3	2.4	1.2	1.8	48.3	7.0	5.3	.1	.4	131.1	29.0	76.1	324.7	69.9	62.2	4.0	98.6	66.7	22.5
Indiana:																							
1940	12.2	16.2	46	3.5	1.4	.1	1.5	2.8	.8	40.1	34.6	(7)	.1	.2	123.1	17.7	152.3	341.4	76.2	(9)	2.8	75.3	74.5	29.1
1939	12.0	15.5	45	4.4	1.0	.5	2.1	1.5	1.5	43.5	45.4	.2	(7)	.7	114.5	17.4	141.8	263.9	97.3	(9)	3.4	66.8	67.0	24.1
1938	11.2	16.1	44	4.7	.2	1.1	2.3	1.7	2.1	41.7	15.4	6.0	.4	.6	114.6	17.4	126.0	249.5	81.4	(9)	4.6	66.6	66.5	27.4
Kentucky:																							
1940	10.7	20.4	55	4.8	1.8	1.3	1.1	4.5	1.5	70.0	42.8	.8	1.0	.4	81.6	15.1	111.2	227.7	74.4	51.1	5.4	73.7	66.6	20.0
1939	10.1	20.7	45	4.1	1.8	1.6	1.4	1.4	2.5	66.0	50.7	1.9	.3	.6	74.3	12.6	97.4	211.7	85.2	49.6	8.6	66.1	61.3	18.3
1938	9.7	22.7	49	4.3	1.7	2.7	1.2	8.1	2.5	73.7	31.2	7.2	1.2	.2	63.4	13.0	100.7	187.8	84.8	63.7	18.4	70.1	53.6	18.4
Louisiana:																							
1940	11.9	19.0	69	6.3	2.6	.6	.1	7.1	1.6	63.3	19.5	1.0	.4	.2	88.8	20.1	71.1	273.8	98.0	62.7	11.3	92.7	70.7	20.0
1939	10.6	18.3	70	6.2	6.0	.5	.3	4.4	2.2	53.3	35.5	7.3	.5	.2	76.9	15.9	71.1	222.7	96.9	63.1	11.7	98.2	57.0	16.0
1938	10.6	18.5	69	7.4	5.1	.8	.3	4.2	1.9	65.5	30.9	.6	.4	.6	80.7	16.2	63.0	200.0	93.2	67.3	15.2	96.4	62.1	17.0
Maine:																							
1940	12.4	17.3	57	4.4	.5	1.7	1.2	1.7	1.0	28.8	16.2	1.7	(7)	.2	144.9	31.8	133.8	371.2	61.5	54.7	5.2	95.5	64.9	17.6
1939	13.8	17.3	57	4.6	1.4	.2	.5	4.6	3.6	35.0	32.8	.7	1.4	.2	153.4	26.8	133.9	411.4	102.1	53.7	4.1	88.2	64.0	15.1
1938	12.6	18.0	51	4.8	1.7	(7)	(7)	2.7	1.4	30.4	23.4	2.9	.7	.2	146.0	29.6	116.2	343.9	97.6	57.8	5.5	87.2	57.1	13.7
Maryland:																							
1940	13.1	16.4	52	3.1	.4	.6	.4	2.8	.4	85.4	13.8	.1	.2	.4	137.4	34.8	105.5	379.5	86.4	49.8	3.2	145.6	72.8	22.3
1939	12.5	15.5	52	3.5	.6	.8	.2	1.1	1.2	76.0	14.6	1.7	(7)	.6	135.0	30.5	105.5	342.9	91.4	50.1	4.6	129.8	68.8	19.3
1938	12.0	16.1	56	3.8	.8	.9	.9	4.3	.8	77.1	10.0	.7	(7)	1.4	126.9	28.4	96.0	321.9	97.0	52.0	5.6	129.9	62.3	18.8
Massachusetts:																							
1940	12.2	(9)	(9)	(9)	.3	.2	.3	.4	.3	40.4	4.5	.3	(7)	.3	173.8	39.1	107.7	439.4	71.7	54.4	2.1	78.3	60.3	12.5
1939	12.4	(9)	(9)	(9)	.3	.6	.6	1.6	.2	39.8	9.4	.7	(9)	.3	159.7	38.3	110.7	437.8	98.5	56.2	1.9	70.6	58.7	12.5
1938	12.6	(9)	(9)	(9)	.3	.5	1.0	1.0	.3	40.9	5.1	.2	.2	.2	161.4	35.4	102.4	397.6	96.6	57.2	2.3	74.4	55.0	13.1
Minnesota:																							
1940	9.8	18.5	35	2.3	.1	.3	.7	.9	.3	26.0	12.7	.3	.1	.6	132.5	27.5	95.7	290.3	65.9	50.6	2.3	39.7	59.7	17.7
1939	10.2	17.6	40	2.9	.1	.3	.7	.6	.4	31.6	20.4	4.3	.1	.2	137.0	28.5	96.4	270.8	73.9	57.0	3.1	43.2	62.8	15.2
1938	9.5	17.1	40	3.5	.2	.4	1.7	2.6	.3	29.5	10.2	.7	.2	.4	136.1	25.4	85.7	243.4	74.8	50.6	1.8	43.7	60.6	18.9
Mississippi:																							
1940	10.9	(9)	(9)	(9)	.8	.9	(7)	7.0	1.7	46.2	63.8	.4	.7	.5	60.4	13.8	76.3	163.8	59.6	50.2	7.9	105.7	77.5	16.8
1939	10.7	(9)	(9)	(9)	1.1	1.4	.1	7.3	1.1	50.4	50.6	6.8	1.0	.5	60.0	12.7	73.8	165.7	74.8	59.1	14.4	93.0	55.1	15.2
Montana:																							
1940	10.4	20.2	41	3.9	.7	1.1	3.3	.7	.7	44.2	17.0	1.5	(7)	1.8	116.8	11.2	101.5	243.0	58.4	65.3	2.2	55.8	84.5	22.8
1939	10.9	19.1	58	3.6	1.1	.7	1.5	5.1	1.1	46.7	30.0	5.8	(7)	1.5	103.9	17.9	93.7	243.6	87.2	60.5	4.7	57.3	86.4	23.0
1938	10.6	19.0	41	3.8	.7	1.5	2.9	1.8	1.8	49.1	27.1	1.5	(7)	.4	98.4	19.0	88.2	220.2	96.9	65.8	2.9	47.2	100.2	20.1
Nevada:																							
1940	11.5	18.5	14	5.9	(7)	1.8	(7)	(7)	1.8	63.6	9.1	(7)	1.8	(7)	114.4	21.8	69.0	303.3	78.1	85.4	5.4	59.0	118.9	61.8
1939	11.4	17.0	47	2.2	(7)	(7)	(7)	(7)	(7)	53.7	9.3	3.7	(7)	(7)	114.0	7.4	81.5	291.7	111.2	46.3	2.2	16.3	122.3	46.3
1938	11.3	10.2	13	3.5	1.9	(7)	(7)	1.9	5.7	64.1	1.9	(7)	(7)	(7)	96.2	15.1	79.2	264.1	122.6	54.7	1.9	73.6	98.1	35.8
New Jersey:																							
1940	11.4	13.7	38	2.7	.3	(8)	.7	.6	.5	45.1	6.5	.3	.1	.4	141.3	39.6	93.6	383.6	58.2	55.1	2.5	84.7	57.9	18.1
1939	11.2	13.5	43	3.1	.2	.5	.8	1.5	.5	46.7	9.8	(7)	.1	.5	138.3	37.2	89.5	377.0	65.8	57.9	3.2	75.7	55.4	17.8
1938	11.0	13.3	43	2.4	.2	.8	.4	1.1	1.0	49.2	6.7	1.5	.1	.9	132.8	32.2	85.7	353.9	76.8	60.2	3.2	80.1	57.0	19.2

See footnotes at end of table.

Provisional mortality from certain causes in the first 6 months of 1940, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths), per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid fever (1-2)	Cerebrospinal (meningococcus) meningitis (6)	Scarlet fever (8)	Whooping cough (9)	Diphtheria (10)	Tuberculosis, all forms (13-22)	Influenza (grippe) (33)	Measles (35)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83a, b)	Diseases of the heart (90-95)	Pneumonia, all forms (107-109)	Diseases of the digestive system (115-129)	Diarrhea and enteritis under 2 years (119)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170a, b, e)
31 STATES—continued																								
New Mexico:																								
1940	10.5	33.3	71	4.6	1.1	(7)	(7)	10.2	1.9	80.6	16.7	.4	(7)	(7)	52.2	10.6	45.0	114.7	62.8	56.0	14.8	56.8	82.1	34.8
1939	11.8	29.6	99	5.2	1.9	1.5	.8	7.7	4.3	79.0	35.6	1.5	.4	(7)	52.7	7.4	43.0	118.1	121.6	61.6	10.5	51.5	72.4	33.3
1938	11.0	28.3	83	5.2	2.0	.8	1.2	17.8	3.2	76.7	17.0	18.6	.8	(7)	53.4	5.9	42.3	121.3	93.7	69.6	18.2	58.1	71.5	26.1
New York:																								
1940	11.4	14.4	39	3.5	.1	.5	.5	1.2	.1	49.5	4.5	.2	(8)	1.1	157.7	43.5	77.1	418.2	57.5	59.7	3.2	70.9	59.9	14.9
1939	12.1	14.2	43	3.1	.2	.6	.5	1.0	.3	51.5	6.6	.6	.1	.4	156.1	43.4	71.5	395.3	77.8	61.7	4.5	76.4	59.4	14.2
1938	11.7	14.2	43	3.9	.3	1.0	.7	1.2	.4	52.8	4.8	1.3	(8)	.8	152.8	37.4	66.9	374.8	80.0	62.1	5.2	76.7	59.2	16.1
North Carolina:																								
1940	9.7	22.4	62	6.0	.5	.3	.4	2.3	2.9	52.5	38.0	.5	.2	.3	59.4	15.4	91.0	159.6	79.4	42.9	7.3	106.8	60.1	22.7
1939	9.4	21.9	63	5.5	.6	.5	.5	8.1	2.8	54.6	28.0	3.1	.1	.2	57.6	13.7	83.7	165.0	80.0	58.2	15.4	83.9	59.8	22.0
1938	10.1	22.9	69	6.4	1.3	1.2	.7	7.7	3.7	56.7	19.3	11.9	.3	.6	54.5	11.0	84.8	168.9	96.1	73.9	27.5	94.2	59.8	21.5
North Dakota:																								
1940	8.0	21.3	41	1.5	.9	(7)	1.6	2.2	1.6	18.6	13.9	.3	(7)	1.6	97.6	24.6	72.7	207.2	43.1	48.5	5.0	43.5	48.8	13.9
1939	8.7	20.9	52	3.6	.9	.9	1.6	2.5	.6	23.8	30.7	6.3	(7)	1.3	91.9	24.2	76.9	204.6	72.2	54.6	6.6	44.2	41.4	10.7
1938	7.7	20.2	45	1.7	(7)	1.6	3.7	9.4	.9	26.2	12.2	3.1	(7)	.6	91.0	21.8	61.7	156.2	63.9	51.7	5.6	46.1	43.6	11.5
Ohio:																								
1940	11.9	15.8	40	3.8	.8	.6	.8	1.7	.5	42.8	20.6	(7)	(8)	.5	136.5	31.9	117.3	335.2	67.6	52.9	3.3	83.0	82.9	24.7
1939	11.9	14.9	45	4.2	.5	.2	1.5	1.2	.9	46.8	30.3	.1	.1	.6	129.9	30.6	115.8	320.2	80.7	57.3	2.8	82.1	77.9	22.7
1938	11.2	15.9	46	3.6	.4	.9	1.6	1.9	1.1	48.3	14.5	5.0	.2	.3	126.0	27.5	105.5	285.3	76.0	58.7	3.4	80.3	77.9	23.3
Oklahoma:																								
1940	9.1	17.8	48	3.6	1.5	1.4	.4	1.6	2.9	49.6	33.9	.3	1.1	.8	83.2	16.2	81.5	169.6	73.4	52.3	3.5	64.5	55.8	17.4
1939	9.5	18.1	58	4.1	2.2	.4	1.1	1.2	2.8	48.2	34.4	6.3	.4	.4	80.2	14.0	90.5	169.9	89.1	53.3	6.0	61.9	97.9	20.7
1938	9.2	19.2	47	4.7	2.5	.5	1.0	11.7	4.7	53.5	25.0	3.5	1.5	.5	78.5	14.6	74.3	147.5	78.1	58.7	7.0	66.8	74.8	22.8
South Carolina:																								
1940	10.9	20.1	78	7.2	1.8	.3	.1	2.2	1.9	48.0	56.3	.7	.6	.2	55.4	14.6	108.9	210.4	85.6	42.4	3.1	95.8	75.5	27.6
1939	9.7	19.0	76	6.5	2.9	.6	.2	9.6	1.8	43.0	37.5	.7	2.6	.3	49.3	13.1	92.6	183.3	77.1	33.6	5.1	86.7	60.2	23.1
1938	10.7	19.1	92	9.0	3.1	.8	.6	15.5	1.3	48.8	42.8	13.0	.5	.5	50.3	11.1	91.1	186.2	100.7	41.5	10.7	83.8	52.2	21.2

Tennessee:																								
1940	10.6	16.9	59	5.6	.8	.7	.7	3.0	1.2	78.9	50.2	1.1	.1	.4	70.1	16.5	89.0	212.0	94.8	50.6	3.6	63.6	60.6	15.0
1939	9.7	15.7	59	5.5	1.5	.7	.7	3.5	1.5	79.6	50.7	1.7	.5	.7	69.3	12.8	80.7	170.9	88.1	55.3	7.7	59.3	56.1	16.0
1938	9.8	16.2	66	6.3	1.6	1.7	.4	8.2	2.4	77.5	33.4	12.3	.6	.4	69.3	10.2	81.1	163.3	94.9	69.6	18.1	61.3	55.8	16.6
Utah:																								
1940	9.4	25.0	30	2.4	.4	.7	2.3	3.1	(7)	19.6	18.1	1.5	.4	.4	96.7	18.1	58.6	257.7	44.3	53.9	2.3	57.8	79.4	29.3
1939	8.6	24.0	41	2.9	.4	1.1	.4	.7	.4	16.3	12.6	.4	(7)	.4	91.7	17.0	52.1	238.9	55.8	57.6	2.2	61.8	66.9	23.3
1938	9.0	24.3	44	4.3	(7)	2.6	1.9	5.2	1.9	22.4	12.7	3.7	(7)	.4	84.2	19.7	49.2	232.8	70.4	57.7	1.9	49.9	85.3	32.0
Vermont:																								
1940	11.8	18.6	35	4.5	1.1	.6	(7)	2.8	(7)	39.9	16.9	(7)	(7)	(7)	127.1	22.5	129.9	330.1	82.7	46.7	4.5	79.9	44.4	10.7
1939	12.3	15.9	38	3.5	(7)	.6	1.7	5.1	1.7	47.3	40.6	1.1	.6	.6	143.2	37.2	124.0	413.7	117.2	46.2	5.1	82.9	60.9	13.5
1938	11.9	15.9	36	3.5	(7)	(7)	.6	3.9	6.8	44.5	19.7	6.8	.6	.6	132.4	28.7	121.1	330.7	111.5	61.4	2.3	90.1	51.8	15.8
Virginia:																								
1940	11.8	19.2	64	4.9	.5	1.6	.5	4.3	2.0	62.3	41.9	1.2	.3	.8	78.8	22.1	109.5	274.1	93.3	43.7	4.5	116.7	75.8	25.3
1939	11.2	18.7	68	5.6	.7	1.1	.2	5.9	2.7	64.2	33.8	1.2	.3	.3	77.0	18.8	107.4	255.8	86.3	47.2	5.8	91.9	66.1	24.1
1938	11.2	19.2	68	5.5	1.3	2.2	.2	8.3	2.7	70.6	24.9	6.2	.3	.2	78.4	16.9	97.9	240.5	89.5	51.5	10.2	86.0	65.9	22.5
West Virginia:																								
1940	9.4	18.9	59	5.4	1.6	2.0	1.0	4.2	2.4	48.4	28.6	(7)	.6	.3	70.7	17.4	81.3	176.2	66.9	38.4	4.6	68.1	87.2	17.3
1939	9.2	19.4	58	3.7	2.1	1.8	1.4	2.1	1.9	49.0	29.3	.3	.2	.9	69.6	17.4	80.3	179.7	80.6	44.2	5.3	6.8	67.6	15.1
1938	9.5	20.4	64	3.9	2.0	2.8	1.8	10.1	2.7	50.5	26.4	11.5	1.1	.8	70.0	16.5	74.3	167.2	87.8	50.5	7.7	72.6	70.0	16.7
Wyoming:																								
1940	8.3	19.0	44	4.7	(7)	3.3	(7)	.8	1.6	15.5	7.3	3.3	.8	.8	82.9	15.5	74.8	191.9	39.8	45.5	.8	62.6	88.6	37.4
1939	8.9	18.5	54	4.9	.8	(7)	(7)	.8	1.6	25.5	19.7	.8	(7)	(7)	81.4	14.0	60.9	215.5	59.2	54.2	1.6	73.2	88.8	32.1
1938	9.3	18.2	58	4.5	(7)	1.7	.8	21.6	1.7	19.1	19.9	(7)	(7)	.8	90.4	12.4	68.0	204.9	85.5	69.7	7.5	49.0	99.6	31.5

1 Includes all States with data for the 6-month period of 1940, 1939, and 1938. The District of Columbia is included as a State. Estimated population July 1, 1940, 78,322,500.

2 These data are taken from the July 1938, 1939, and 1940 Statistical Bulletins published by the Metropolitan Life Insurance Co. All figures are provisional and are subject to correction, since they are based on provisional estimates of lives exposed to risk. Data do not include all diseases reported to the Public Health Service.

3 Excludes pericarditis, acute endocarditis, and acute myocarditis.

4 Classified as diarrhea and enteritis, age not specified.

5 Chronic nephritis only.

6 Excludes collisions between automobiles and trains or street cars.

7 No deaths reported.

8 Less than 0.1 per 100,000 population.

9 Data not available.

SINUS INFECTION (SINUSITIS)[1]

Definition.

Sinusitis is a disease of the lining and bony walls of the air-containing spaces of the bones in the face. All of these cavities communicate with the nasal passages by small openings. The intimate relation of sinusitis to disorders of the nose can readily be seen when one considers that infections in the nose may travel into the sinuses through these openings, or that any inflammation of the nose may close the mouths of the sinuses, thus interfering with proper drainage and favoring disease. Prolonged closure of the mouth of a sinus is followed by absorption of the air in the cavity with the formation of a vacuum and results in pain in the region of the involved sinus. When the lining of a sinus becomes inflamed, a profuse secretion forms which, when drainage is interfered with, may cause intense pain from actual pressure on the sinus wall.

The sinuses more commonly affected are the (1) *ethmoids* which lie between and behind the eyes, (2) the *maxillary* situated below the eye in the cheek bones, and (3) the *frontals* which are located above the eyes.

Sinusitis is a common disease and causes much ill health, suffering, and lowered vitality.

Cause.

Sinusitis is most frequently due to an extension of infection from the lining of the nose which results from either the common head cold or influenza. Injuries to the facial bones, bathing, and diving have been recorded as factors. In the case of the maxillary sinus, dental disease and tooth extraction may be responsible as the roots of the upper back teeth are frequently in contact with or protrude through the floor of the sinus. Allergy and dietary deficiencies are important predisposing factors.

Symptoms.

A head cold that lingers on or repeated attacks of head colds may be the only warning that sinus disease is present. The usual symptoms are nasal obstruction and a discharge of mucopus or pus depending upon the severity of infection. The discharge may be slight, and evident only as post-nasal dripping, or it may be very profuse. Dull headache or pain is present over the affected sinus. In the acute stage, when the natural drainage of the sinus is interfered with, headache is more severe.

Diagnosis.

A physician competent in the treatment of diseases of the nose should be consulted to make the proper diagnosis. The X-ray is of considerable assistance.

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[1] This material is available in leaflet form and a limited number of copies may be obtained by addressing the Surgeon General, U S Public Health Service, Washington, D C.

Treatment.

Medical treatment is directed toward the relief of pain, the lessening of discharge, and an attempt to diminish absorption from a sinus acting as a focus of infection. When medical treatment fails to give relief, surgery is directed to establish drainage.

Prevention.

The most important means of preventing sinus infection is to observe the modern rules of personal hygiene and so to maintain good general health and body resistance to disease. This includes following a diet which supplies the necessary variety of foods, obtaining sufficient amount of rest, both mental and physical, to avoid exhaustion of strength, protection to the body when out-of-doors, and a regard for the temperature and ventilation of the home. Fresh warm air of a proper degree of moisture, free from appreciable draft, is now recognized as essential to indoor workers.

Since the common cold is often the forerunner of sinus disease close contact with a person afflicted with a cold should be avoided. When one has a cold the mouth and nose should be covered on unavoidable coughing or sneezing. Secretions from the nose and throat should be carefully disposed of so that no other person may be exposed.

Effect of Climate.

Your physician will be able to advise whether or not a change of climate is indicated. Certainly a change of climate should not be considered until regulation of personal hygiene and medical and surgical treatment have been given a thorough trial.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT. CONSULT YOUR DOCTOR

COURT DECISION ON PUBLIC HEALTH

Statute regulating tourist camps in a particular county held unconstitutional.—(South Carolina Supreme Court; *Sansing* v. *Cherokee County Tourist Camp Board et al.*, *Spencer* v. *Same*, 10 S.E.2d 157 decided July 18, 1940.) The Cherokee County tourist camp board was created by a 1939 act of the general assembly of South Carolina This act was a local or special act which related solely to the county of Cherokee and which contained provisions, among others, pertaining to the health of employees and sanitary facilities at tourist camps. In actions in which the plaintiffs sought to have the said board permanently enjoined from enforcing the provisions of the act, the act was assailed on the ground that it was in contravention of the State constitutional provision prohibiting the enactment of a special law where a general law could be made applicable. The view taken by

the supreme court was that the act did run counter to such constitutional prohibition and that the plaintiffs were entitled to a permanent injunction against the enforcement of the law. The court said that it had been demonstrated that a general law could be made applicable, citing a law which vested the State board of health with power to adopt and file regulations with reference to health and sanitary conditions in all tourist camps in the State and giving a reference to the regulations.

DEATHS DURING WEEK ENDED OCTOBER 19, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 19, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,632	7,846
Average for 3 prior years	8,026	
Total deaths, first 42 weeks of year	352,863	346,894
Deaths under 1 year of age	498	448
Average for 3 prior years	477	
Deaths under 1 year of age, first 42 weeks of year	21,064	21,002
Data from industrial insurance companies:		
Policies in force	64,784,337	66,567,106
Number of death claims	10,765	11,720
Death claims per 1,000 policies in force, annual rate	8.7	9.2
Death claims per 1,000 policies, first 42 weeks of year, annual rate	9.7	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 26, 1940

Summary

As compared with the preceding week, slight increases were recorded during the current week for each of the 9 communicable diseases included in the weekly table, with the exception of poliomyelitis. The incidence of 4 of these diseases—influenza, measles, poliomyelitis, and whooping cough—was above the 5-year (1935–39) median expectancy, while the cumulative totals to date of only 2—influenza and poliomyelitis—were above the 5-year cumulative medians.

The number of cases of poliomyelitis declined from 514 for the preceding week to 434 for the current week, as compared with a 5-year median of 197 cases. Most of the States reported a decrease. Wisconsin reported the highest number of cases, 52, as compared with 29 for the preceding week.

For most of the weeks during the current year, the incidence of influenza has been above the 5-year median expectancy. Up to and including the current week (43 weeks), 174,921 cases have been reported, as compared with a 5-year cumulative median of 145,393 cases. The number of cases reported in 1940 to date was exceeded in only 1 year during the preceding 5 years, 1937, when 279,394 cases had been reported for the corresponding period. Texas, with 217 cases, South Carolina, with 198, and Arizona, with 112, reported the highest incidence for the current week.

Current reports show 11 cases of undulant fever, 4 cases of tularaemia, and 74 cases of endemic typhus fever, of which 38 were in Georgia, 10 in Alabama, 7 in Texas, and 5 each in Florida and Mississippi.

The Bureau of the Census reports 8,074 deaths in 88 major cities of the United States for the current week, as compared with 7,632 for the preceding week, and with a 3-year average of 8,024 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended October 26, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria, Week ended— Oct. 26, 1940	Diphtheria, Week ended— Oct. 28, 1939	Diphtheria, Median, 1935–39	Influenza, Week ended— Oct. 26, 1940	Influenza, Week ended— Oct. 28, 1939	Influenza, Median, 1935–39	Measles, Week ended— Oct. 26, 1940	Measles, Week ended— Oct. 28, 1939	Measles, Median, 1935–39	Meningitis, meningococcus, Week ended— Oct. 26, 1940	Meningitis, meningococcus, Week ended— Oct. 28, 1939	Meningitis, meningococcus, Median, 1935–39
NEW ENG.												
Maine	1	2	2	1	------	------	71	2	14	0	0	0
New Hampshire	0	0	0	------	------	------	0	4	1	0	0	0
Vermont	0	0	0	------	------	------	6	20	14	0	0	0
Massachusetts	5	7	7	------	------	------	159	73	53	1	1	2
Rhode Island	0	1	0	------	------	------	0	20	4	0	0	0
Connecticut	1	0	2	------	1	1	3	8	8	0	0	0
MID. ATL.												
New York	16	18	29	[1] 3	[1] 8	[1] 7	157	89	89	0	1	6
New Jersey	8	9	10	1	3	5	74	7	23	0	1	1
Pennsylvania	6	34	25	------	------	------	369	38	46	2	4	4
E. NO. CEN.												
Ohio	9	34	64	15	18	9	11	17	24	0	1	3
Indiana	8	31	31	9	3	10	16	14	6	3	0	3
Illinois	12	32	35	5	11	8	135	13	17	2	3	3
Michigan [2]	6	3	20	------	5	2	168	67	24	1	2	2
Wisconsin	1	0	3	25	15	26	131	14	33	0	1	1
W. NO. CEN.												
Minnesota	1	3	6	2	3	2	0	12	12	1	1	1
Iowa	9	11	11	4	1	1	55	5	5	0	1	1
Missouri	13	14	21	1	------	35	7	4	9	0	0	0
North Dakota	4	0	3	------	4	4	0	7	3	1	1	0
South Dakota	1	5	2	------	------	------	2	28	3	0	0	0
Nebraska	5	1	2	------	------	------	8	2	2	0	0	0
Kansas	6	3	12	7	7	3	6	43	3	0	0	0
SO. ATL.												
Delaware	0	0	0	------	------	------	1	1	1	0	0	0
Maryland [2]	5	11	11	2	9	6	2	5	6	1	0	1
Dist. of Col	0	1	7	------	------	1	2	2	1	0	0	1
Virginia	27	92	77	56	47	------	29	6	9	0	1	3
West Virginia [2]	4	28	39	2	------	11	1	2	2	2	0	2
North Carolina [3, 4]	85	183	142	3	5	5	6	68	51	0	2	2
South Carolina [4]	27	31	29	193	221	221	2	1	6	2	1	1
Georgia [4]	28	61	57	19	32	------	3	2	------	0	1	0
Florida [4]	5	8	18	------	2	2	2	1	2	0	0	0
E. SO. CEN.												
Kentucky	20	22	41	------	1	9	51	3	35	2	2	2
Tennessee	16	29	58	19	5	22	16	2	2	2	1	3
Alabama [4]	31	44	44	24	53	36	3	2	2	1	1	2
Mississippi [2, 4]	11	17	17	------	------	------	------	------	------	1	1	0
W. SO. CEN.												
Arkansas	12	24	24	35	24	19	0	4	4	0	1	0
Louisiana [4]	20	21	25	4	25	12	1	1	1	0	1	1
Oklahoma	24	12	25	18	70	33	6	2	2	0	0	1
Texas [4]	47	18	39	217	194	153	17	7	7	0	1	1
MOUNTAIN												
Montana	2	1	1	16	4	10	7	51	34	0	0	0
Idaho	0	0	0	5	------	2	0	9	9	0	0	0
Wyoming	1	3	1	------	2	------	4	35	2	1	0	0
Colorado	7	9	10	6	6	------	16	18	6	1	0	0
New Mexico	0	1	3	------	1	2	25	1	19	0	0	0
Arizona	5	5	8	112	58	29	14	2	2	0	1	0
Utah [2]	1	0	1	12	2	1	1	7	8	0	0	0
Nevada	0	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	7	2	2	------	------	------	5	229	11	0	0	1
Oregon [2]	1	1	3	7	8	21	9	17	14	1	1	1
California	23	8	28	28	13	17	73	55	55	2	3	2
Total	521	840	1,018	856	861	756	1,674	1,020	1,317	27	35	60
43 weeks	12,218	17,800	20,947	174,921	156,891	145,393	237,570	354,791	354,791	1,374	1,660	4,732

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 26, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	Oct. 26, 1940	Oct. 28, 1939		Oct. 26, 1940	Oct. 28, 1939		Oct. 26, 1940	Oct. 28, 1939		Oct. 26, 1940	Oct. 28, 1939	
NEW ENG.												
Maine	0	0	0	14	9	10	0	0	0	1	1	2
New Hampshire	0	0	0	8	3	3	0	0	0	0	0	0
Vermont	0	3	0	12	11	5	0	0	0	1	0	1
Massachusetts	0	5	4	61	32	92	0	0	0	3	1	1
Rhode Island	0	0	0	3	3	10	0	0	0	1	0	1
Connecticut	2	0	2	7	30	34	0	0	0	5	3	2
MID. ATL.												
New York	12	42	14	163	130	188	0	0	0	4	18	14
New Jersey	3	5	4	66	59	59	0	0	0	1	5	4
Pennsylvania	5	16	4	111	187	192	0	0	0	7	15	20
E. NO. CEN.												
Ohio	33	8	7	156	169	251	0	0	0	5	6	13
Indiana	14	7	4	47	101	110	1	1	3	1	3	3
Illinois	38	8	12	178	209	213	13	1	2	18	15	18
Michigan [2]	45	25	14	119	178	178	0	0	0	2	19	9
Wisconsin	52	3	1	104	98	137	6	0	0	0	1	1
W. NO. CEN.												
Minnesota	13	13	1	57	77	78	0	1	2	1	1	1
Iowa	48	17	3	58	68	68	1	6	4	2	2	3
Missouri	10	1	1	44	64	67	0	0	0	8	12	18
North Dakota	2	1	1	4	31	28	0	0	0	2	1	1
South Dakota	4	4	2	23	14	33	0	0	0	1	1	1
Nebraska	7	1	1	22	24	24	1	0	1	0	0	0
Kansas	20	1	1	59	67	88	0	0	0	1	3	3
SO. ATL.												
Delaware	0	0	0	3	7	5	0	0	0	3	3	3
Maryland [2]	1	2	1	20	35	37	0	0	0	6	10	10
Dist. of Col.	0	0	1	8	11	13	0	0	0	0	1	2
Virginia	12	2	2	49	67	65	0	0	0	10	6	14
West Virginia [2]	31	1	1	34	86	90	0	0	0	5	3	10
North Carolina [3] [4]	1	1	2	128	123	92	0	0	0	3	3	9
South Carolina [4]	0	1	1	39	27	14	0	0	0	11	13	8
Georgia [1]	1	2	1	38	38	33	0	0	0	21	15	13
Florida [4]	2	1	1	4	3	5	0	0	0	3	1	1
E. SO. CEN.												
Kentucky	13	5	5	56	73	77	0	0	0	23	5	12
Tennessee	4	0	1	81	71	66	1	0	0	7	5	13
Alabama [4]	4	1	1	40	51	27	0	0	0	11	13	11
Mississippi [2] [4]	3	0	2	21	16	16	0	0	0	2	5	6
W. SO. CEN.												
Arkansas	3	2	2	7	16	16	0	0	0	7	13	6
Louisiana [4]	3	1	1	10	12	14	0	0	0	7	9	12
Oklahoma	0	0	0	23	20	21	2	3	0	15	5	13
Texas [4]	2	3	3	38	48	56	1	1	1	12	14	32
MOUNTAIN												
Montana	4	0	0	11	31	31	0	0	10	0	6	3
Idaho	4	3	0	13	3	18	1	1	2	0	1	3
Wyoming	9	0	0	11	5	9	0	0	0	1	0	0
Colorado	2	9	1	26	23	26	0	7	3	5	6	3
New Mexico	0	7	0	4	7	14	0	0	0	2	8	11
Arizona	0	1	0	3	0	3	0	0	0	0	1	2
Utah [2]	7	7	1	8	10	12	0	0	0	1	0	0
Nevada	0			1			0			0		
PACIFIC												
Washington	13	1	3	27	41	34	0	2	2	6	3	3
Oregon [3]	0	2	2	13	17	25	1	1	1	7	3	3
California	7	35	14	97	106	153	0	1	1	7	9	10
Total	434	247	197	2,129	2,511	2,882	28	25	76	239	268	331
43 weeks	8,383	6,245	6,215	131,380	131,066	153,639	2,059	8,910	8,662	5,599	11,271	12,670

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended October 26, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, week ended— Oct. 26, 1940	Whooping cough, week ended— Oct. 28, 1939
NEW ENG.		
Maine	9	19
New Hampshire	13	0
Vermont	14	24
Massachusetts	142	96
Rhode Island	4	30
Connecticut	81	54
MID. ATL.		
New York	405	272
New Jersey	131	114
Pennsylvania	556	245
E. NO. CEN.		
Ohio	254	169
Indiana	19	31
Illinois	192	171
Michigan [2]	322	111
Wisconsin	168	158
W. NO. CEN.		
Minnesota	52	64
Iowa	6	18
Missouri	57	24
North Dakota	27	4
South Dakota	2	0
Nebraska	9	1
Kansas	54	2
SO. ATL.		
Delaware	24	4
Maryland [2]	81	56
Dist. of Col.	7	12
Virginia	35	24
West Virginia [2]	25	8
North Carolina [3,4]	61	61
South Carolina [4]	21	7

Division and State	Whooping cough, week ended— Oct. 26, 1940	Whooping cough, week ended— Oct. 28, 1939
SO. ATL.—continued		
Georgia [4]	11	4
Florida [4]	6	0
E. SO. CEN.		
Kentucky	88	58
Tennessee	35	36
Alabama [4]	28	49
Mississippi [2,4]	----------	----------
W. SO. CEN.		
Arkansas	14	5
Louisiana [4]	7	34
Oklahoma	12	0
Texas [4]	96	14
MOUNTAIN		
Montana	0	5
Idaho	8	2
Wyoming	3	8
Colorado	27	13
New Mexico	19	8
Arizona	11	10
Utah [2]	27	39
Nevada	0	----------
PACIFIC		
Washington	56	12
Oregon [3]	10	27
California	263	134
Total	3,492	2,237
43 weeks	134,993	150,098

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Rocky Mountain spotted fever, week ended October 26, 1940, 2 cases as follows: North Carolina, 1; Oregon, 1.
[4] Typhus fever, week ended October 26, 1940, 74 cases as follows: North Carolina, 1; South Carolina, 4; Georgia, 38; Florida, 5; Alabama, 10; Mississippi, 5; Louisiana, 4; Texas, 7.

WEEKLY REPORTS FROM CITIES

City reports for week ended October 12, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	162	69	23	224	401	594	3	329	54	831	--------
Current week [1]	50	50	11	320	299	439	0	271	31	1,052	--------
Maine:											
Portland	0	------	0	0	1	0	0	0	0	2	18
New Hampshire:											
Concord	0	------	0	0	1	1	0	0	0	0	4
Nashua	0	------	0	0	0	1	0	0	0	0	3
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	1	0	0	0	1	9
Rutland	0	------	0	0	0	0	0	0	0	0	7
Massachusetts:											
Boston	0	------	0	13	11	6	0	10	0	47	180
Fall River	0	------	0	0	0	0	0	2	0	10	28
Springfield	0	------	0	0	0	3	0	2	0	4	31
Worcester	1	------	0	32	1	0	0	0	0	1	38
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	18
Providence	0	------	0	0	0	1	0	2	0	1	50
Connecticut:											
Bridgeport	0	------	0	0	2	1	0	0	0	5	41
Hartford	0	------	0	0	1	1	0	1	0	1	33
New Haven	0	1	0	0	1	0	0	0	0	26	26
New York:											
Buffalo	0	------	0	1	9	9	0	2	0	11	100
New York	10	7	1	66	52	48	0	57	9	119	1,371
Rochester	0	------	0	3	3	1	0	1	0	8	64
Syracuse	0	------	0	0	0	0	0	0	0	1	43
New Jersey:											
Camden	0	------	0	4	0	1	0	1	0	0	25
Newark	0	------	0	17	1	12	0	12	0	22	80
Trenton	0	------	0	0	1	3	0	1	0	1	46
Pennsylvania:											
Philadelphia	3	2	1	58	8	23	0	17	3	109	394
Pittsburgh	0	1	1	0	6	10	0	8	0	24	148
Reading	0	------	0	0	1	0	0	2	0	35	34
Scranton	0	------	--------	0	-------	0	0	-------	0	0	--------
Ohio:											
Cincinnati	1	1	0	1	5	6	0	4	1	6	126
Cleveland	0	7	0	0	9	8	0	2	1	73	193
Columbus	0	1	1	0	1	2	0	2	0	24	72
Toledo	0	1	0	2	1	1	0	8	0	9	67
Indiana:											
Anderson	0	------	0	0	1	0	0	0	0	0	15
Fort Wayne	0	------	0	0	2	1	0	0	0	1	24
Indianapolis	2	------	1	3	8	2	0	6	0	8	99
Muncie	0	------	0	0	2	1	0	0	0	0	9
South Bend	0	------	0	0	4	0	0	0	0	0	18
Terre Haute	1	------	0	0	2	0	0	0	2	0	29
Illinois:											
Alton	0	------	0	0	0	1	0	0	0	0	9
Chicago	6	2	1	37	25	68	0	40	1	78	672
Elgin	0	------	0	0	0	0	0	0	0	5	8
Moline	0	------	0	0	1	1	0	0	0	0	10
Springfield	0	------	0	0	2	1	0	0	0	2	31
Michigan:											
Detroit	1	2	0	35	9	51	0	8	0	125	257
Flint	0	------	0	0	1	1	0	0	0	11	23
Grand Rapids	0	------	0	0	1	5	0	0	1	31	34
Wisconsin:											
Kenosha	0	------	0	1	0	0	0	0	0	0	8
Madison	0	------	0	2	0	3	0	0	0	3	10
Milwaukee	1	------	0	12	5	23	0	0	0	15	102
Racine	0	------	0	0	0	3	0	1	0	0	10
Superior	0	------	0	0	0	5	0	0	0	0	12
Minnesota:											
Duluth	0	------	0	1	0	0	0	1	0	0	21
Minneapolis	0	------	0	1	1	21	0	1	1	13	87
St. Paul	0	------	0	0	9	9	0	0	0	11	73

[1] Figures for Barre and Boise estimated; reports not received.

City reports for week ended October 12, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	------	------	0	------	5	0	------	0	0	------
Davenport	1	------	------	0	------	3	0	------	0	0	------
Des Moines	0	------	0	0	0	5	0	0	0	0	27
Sioux City	0	------	------	0	------	0	0	------	0	3	------
Waterloo	0	------	------	0	------	3	0	------	0	1	------
Missouri:											
Kansas City	0	------	0	0	4	2	0	3	1	14	75
St. Joseph	0	------	0	0	1	0	0	0	0	0	26
St. Louis	1	------	0	1	7	7	0	1	0	8	173
North Dakota:											
Fargo	0	------	0	0	0	3	0	0	0	1	7
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	------	0	------	0	0	------	0	0	------
South Dakota:											
Aberdeen	0	------	------	0	------	0	0	------	0	0	------
Sioux Falls	0	------	0	0	0	7	0	0	0	0	8
Nebraska:											
Omaha	0	------	0	1	1	1	0	0	1	0	53
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	4
Topeka	0	------	------	0	------	5	0	------	0	0	------
Wichita	0	------	0	0	1	1	0	0	0	3	24
Delaware:											
Wilmington	0	------	0	1	3	0	0	0	0	5	26
Maryland:											
Baltimore	0	1	0	4	8	13	0	13	2	38	194
Cumberland	0	------	0	0	1	0	0	0	0	1	9
Frederick	0	------	0	0	1	0	0	0	0	0	8
Dist. of Col:											
Washington	2	------	0	2	7	5	0	11	1	4	136
Virginia:											
Lynchburg	0	------	0	0	0	0	0	0	0	4	9
Norfolk	1	------	0	1	2	0	0	1	0	0	27
Richmond	0	------	1	0	1	0	0	2	0	0	43
Roanoke	1	------	0	5	1	4	0	1	0	0	11
West Virginia:											
Charleston	0	------	0	0	2	1	0	0	0	2	18
Huntington	0	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	0	0	2	0	0	0	0	0	11
North Carlina:											
Gastonia	3	------	------	0	------	0	0	------	0	0	------
Raleigh	1	------	0	0	0	0	0	0	0	0	5
Wilmington	1	------	0	0	2	1	0	0	1	0	14
Winston-Salem	1	1	0	0	0	8	0	1	0	11	11
South Carolina:											
Charleston	0	2	0	0	1	0	0	0	0	0	14
Florence	0	------	0	0	1	0	0	0	0	0	10
Greenville	0	------	0	1	0	0	0	0	0	0	6
Georgia:											
Atlanta	1	8	0	1	6	9	0	3	0	1	88
Brunswick	0	------	0	0	1	0	0	0	0	0	2
Savannah	0	3	0	1	1	0	0	1	0	0	32
Florida:											
Miami	0	------	0	0	0	1	0	1	0	1	33
Tampa	1	------	0	0	2	0	0	0	0	0	26
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	0	0	11
Covington	0	------	0	1	2	0	0	1	0	0	15
Lexington	0	------	0	3	0	0	0	0	0	1	14
Louisville	0	------	0	1	2	8	0	2	1	7	79
Tennessee:											
Knoxville	1	------	0	0	0	2	0	0	1	0	24
Memphis	0	------	0	1	2	6	0	2	1	4	82
Nashville	0	------	0	0	1	3	0	2	1	7	48
Alabama:											
Birmingham	2	2	0	2	2	3	0	1	2	1	69
Mobile	1	1	0	0	1	0	0	1	0	0	23
Montgomery	0	------	------	0	------	1	0	------	0	2	------
Arkansas:											
Fort Smith	0	------	------	0	------	0	0	------	0	1	------
Little Rock	0	------	0	1	2	0	0	1	0	2	------

City reports for week ended October 12, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet-fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping-cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0	------	0	0	0	0	0	0	0	0	4
New Orleans	0	------	1	3	13	2	0	6	0	1	128
Shreveport	2	------	0	0	3	2	0	1	0	0	27
Oklahoma:											
Oklahoma City	0	------	0	0	1	5	0	4	0	0	36
Tulsa	1	------	0	0	0	2	0	0	1	2	13
Texas											
Dallas	2	------	0	1	1	6	0	2	0	2	55
Fort Worth	1	------	0	3	3	4	0	1	5	1	40
Galveston	0	------	0	0	1	0	0	1	0	0	17
Houston	0	------	1	0	6	2	0	4	2	0	85
San Antonio	1	------	0	0	6	0	0	8	0	2	49
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	7
Great Falls	0	------	0	0	2	0	0	0	0	0	11
Helena	0	------	0	0	0	0	0	0	0	0	4
Missoula	0	------	0	0	0	1	0	0	0	0	5
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Denver	2	------	0	2	7	1	0	1	0	9	88
Pueblo	0	------	1	0	1	1	0	0	0	0	5
New Mexico:											
Albuquerque	0	------	0	0	3	0	0	1	0	0	8
Utah:											
Salt Lake City	0	------	0	0	0	1	0	0	0	2	29
Washington:											
Seattle	0	------	0	1	3	2	0	3	0	3	112
Spokane	0	------	0	0	1	5	0	0	0	0	41
Tacoma	0	------	0	0	0	0	0	0	0	0	31
Oregon:											
Portland	4	------	0	1	5	0	0	2	1	2	82
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	4	8	1	3	3	13	0	14	0	66	334
Sacramento	0	------	0	1	4	2	0	1	0	4	29
San Francisco	1	------	0	4	4	3	0	4	0	32	154

City reports for week ended October 12, 1940—Continued

State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	0	1	0
Springfield	0	0	1
Rhode Island:			
Providence	0	0	1
New York:			
New York	3	1	4
New Jersey:			
Newark	0	0	1
Pennsylvania:			
Philadelphia	0	0	7
Pittsburgh	0	0	1
Ohio:			
Cincinnati	0	0	5
Cleveland	0	0	3
Columbus	0	0	4
Toledo	0	0	1
Indiana:			
Fort Wayne	0	0	1
Indianapolis	0	0	3
Muncie	0	0	2
Illinois:			
Chicago	0	0	11
Michigan:			
Grand Rapids	0	0	2
Wisconsin:			
Madison	0	0	3
Milwaukee	0	0	2
Minnesota:			
Duluth	0	0	5
Minneapolis	0	0	3
St. Paul	0	0	1
Iowa:			
Davenport	0	0	1
Des Moines	0	0	3
Sioux City	0	0	1
Waterloo	0	0	2

State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths	
Missouri:			
Kansas City	0	0	6
St. Joseph	0	0	3
North Dakota:			
Minot	0	0	1
Kansas:			
Topeka	0	0	4
Virginia:			
Lynchburg	0	0	1
Richmond	0	0	1
Roanoke	0	0	1
West Virginia:			
Charleston	0	0	1
Kentucky:			
Louisville	0	1	0
Alabama:			
Birmingham	1	0	1
Louisiana:			
New Orleans	0	0	1
Texas:			
Dallas	0	0	1
Fort Worth	0	0	1
Houston	1	0	0
Montana:			
Missoula	0	0	2
Utah:			
Salt Lake City	0	0	1
Washington:			
Seattle	0	0	2
Spokane	0	0	1
California:			
Los Angeles	0	0	2
Sacramento	0	0	3
San Francisco	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Pittsburgh, 1; Birmingham, 1; Sacramento, 1.

Pellagra.—Cases: Philadelphia, 1; Toledo, 1; Wilmington, N. C., 1; Charleston, S. C., 1; Savannah, 1; Montgomery, 1; New Orleans, 1; Los Angeles, 1.

Typhus fever.—Cases: New York, 2; Charleston, S. C., 2; Atlanta, 4; Savannah, 3; Birmingham, 1; Mobile, 1; New Orleans, 2; Houston, 1. Deaths: Savannah, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended September 14 and 21, 1940.—During the weeks ended September 14 and 21, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Week ended September 14, 1940

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1			1	1		1		4
Chickenpox		6	1	14	43	8	10	8	19	109
Diphtheria		1	1	8	3	5		4		22
Dysentery					1					1
Influenza		2			51	1			20	74
Measles	3		2	9	32	21	2	7	9	85
Mumps					33	13	3		7	56
Pneumonia		1			11	1			3	16
Poliomyelitis		1			10	2				13
Scarlet fever			5	41	50	3	4	11	4	118
Trachoma									2	2
Tuberculosis	2	22	12	36	45	3		3		123
Typhoid and paratyphoid fever		2	1	3	10	1		3	1	21
Whooping cough		1	18	94	74	27	14	11	25	264

Week ended September 21, 1940

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	3					4
Chickenpox		3	1	10	41	10	5	15	17	102
Diphtheria		1		23	1	7	3			35
Dysentery				4						4
Influenza		18			20	1			24	63
Lethargic encephalitis						1	1			2
Measles				50	70	9	14	24	50	217
Mumps				11	44	4	4	3	4	70
Pneumonia		17			2	1			5	25
Poliomyelitis				4	5	1				10
Scarlet fever		1		80	69	14	12	5	6	187
Trachoma									2	2
Tuberculosis	8	7	6	65	61	2		1		145
Typhoid and paratyphoid fever			4	24	7					35
Whooping cough		60		233	88	17	11	1	8	418

CUBA

Habana—Communicable diseases—4 weeks ended September 21, 1940.—During the 4 weeks ended September 21, 1940, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	11	2	Tuberculosis		2
Malaria	1		Typhoid fever	25	7
Scarlet fever	1				

Provinces—Notifiable diseases—4 weeks ended September 14, 1940.—During the 4 weeks ended September 14, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	1	3	2		13	20
Diphtheria	3	12	4	4		5	28
Leprosy		1				2	3
Malaria	13	6		12	1	38	70
Measles						10	10
Scarlet fever		4		1			5
Tuberculosis	18	32	33	29	16	34	162
Typhoid fever	16	61	15	45	23	37	197
Yaws	1						1

VIRGIN ISLANDS OF THE UNITED STATES

Notifiable diseases—July–September 1940.—During the months of July, August, and September 1940, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	July	August	September	Disease	July	August	September
Chickenpox		1	7	Malaria	1		5
Filariasis	2	8	4	Pneumonia (lobar)		1	
German measles			1	Schistosomiasis		1	
Gonorrhea	9	13	10	Syphilis	14	23	8
Hookworm disease	11	7	3	Tetanus			1
Influenza	1,406	6		Tuberculosis		2	1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of October 25, 1940, pages 1973–1976. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Peru—Libertad Department—Trujillo.—During the month of August 1940, 1 case of plague was reported in the city of Trujillo, Libertad Department, Peru.

Yellow Fever

Ivory Coast—Bribomo Circle—Daloa.—On October 21, 1940, 1 death from suspected yellow fever was reported in Daloa, Bribomo Circle, Ivory Coast.

Public Health Reports

VOLUME 55 NOVEMBER 8, 1940 NUMBER 45

IN THIS ISSUE

Teaching of Social Medicine in Colleges and Universities

Home Accidents as Recorded in the National Health Survey

U.S. PUBLIC HEALTH SERVICE
1798

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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CONTENTS

Public Health Reports

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TEACHING OF SOCIAL MEDICINE IN LIBERAL ARTS COLLEGES AND UNIVERSITIES[1]

By JOSEPH HIRSH, *Assistant Health Education Specialist*, and ELIZABETH G. PRITCHARD, *Associate Health Education Specialist, United States Public Health Service*

INTRODUCTION

Since current public health and medical problems have their roots in the evolutionary changes which have occurred in many and diverse fields of thought and action, the term "social medicine" has been adopted to designate a total concept of the social, economic, and psychological problems which affect the health of man. It does not refer to the loosely used and little understood term "socialized medicine," which is popularly understood to mean methods of providing medical services, and as most commonly used, one method, namely state medicine. As used in this study, "social medicine" refers to the economic, social, and psychological problems of public health and medical care, including collective attempts to solve them through public health legislation, tax-supported medical care, voluntary and compulsory health insurance; medical institutions and organizations; and the history of public health and medicine in relation to society.

For centuries, these areas and their interrelationships have been the concern of the professions and of nonprofessional groups. In recent years, however, the growth and accentuation of problems relating to the costs and distribution of public health and medical services have served to intensify that concern. In many fields of endeavor, there has emerged a greater recognition that such diverse problems cannot be stated, explored, or solved as isolated biological, economic, medical, political, or social problems.

[1] Grateful acknowledgment is made to Helen Edelin Crouch for her cooperation in the preparation of data for this study.

Educators have come to realize the importance of these and related issues and have made some attempt to introduce them into the curricula of secondary schools, colleges, and universities. Recognition of this need is especially noteworthy among teachers in the professional schools, who more than others are faced with the real consideration of preparing students to cope with practical problems in a practical world. For example, Dr. F. C. Zapffe, Secretary of the Association of American Medical Colleges, says that medicine—

calls for a good education in arts, in the humanities in the classics, in philosophy. Why do medical educators now insist on economics, sociology, genetics, psychology, philosophy, and mathematics, rather than on more science? Because the physician must be familiar with these subjects if he is to be a true physician. He must know people; understand them; be able to solve many of their problems Treating a patient for his physical ailment is not all of his problem. There is much more to treat; the man must be treated. To do that calls for a very high type of fundamental education besides some knowledge of science.[2]

Conversely, other professions, particularly those concerned with social service, should have a proper understanding of medicine and public health, and of their relation to the general problems of society. The provision of such training is based on the thesis that it will fit the student for humane and effective professional work, as well as for wise and useful citizenship.

PURPOSE

In order to see how liberal arts colleges and universities are preparing students to cope with current individual and social problems in health, the present study was initiated to determine the extent to which courses in social medicine are offered, the content of the courses, and the relative emphasis given them in various departments of the college. Since social medicine touches upon almost every problem of contemporary society, it is believed that the data of this study may also throw some light on the ways in which the college is preparing students for effective citizenship.

SAMPLE

Without any attempt at an exact definition, the liberal arts college may be described as an institution giving four years of nonprofessional training beyond the secondary school level. Its chief aims have been described variously,[3] but it may be said in a general way that its purpose is twofold: (1) To prepare students, through general education, for intelligent individual and social living, and (2) to serve as an agency for professional school recruitment.

---

[2] Zapffe, F. C.; The Relation Between General Education and Medical Education. National Society for Study of Education 38th Yearbook, Part II, General Education in the American College. Public School Publishing Company, Bloomington, Ill., 1939.

[3] Russell, J. D · General Education in the Liberal Arts Colleges. National Society for the Study of Education. 38th Yearbook, Part II, General Education in the American College. Public School Publishing Company, Bloomington, Ill., 1939

In collaboration with the Division of Higher Education of the United States Office of Education, 230 liberal arts colleges and universities were chosen to which a questionnaire might be directed. These institutions were taken from the 1940 directory [4] of the United States Office of Education.

The sample comprises more than 34 percent of the colleges and universities in this country.[5] Small colleges were selected along with large universities, private institutions, with governmentally owned and operated institutions. Every State in the Union is represented, but because the greatest number of schools are located in the northeastern section of the United States, most of the institutions represented in this study were chosen from this region. (See fig. 1.)

The majority of accredited schools [6] are included in the sample. Two hundred and twenty-three institutions, or 97 percent, have been accredited either by the national or by a regional association. Two were provisionally accredited, accredited with some reservation, or admitted on probation, and 5 were not accredited. It is interesting to note that 192 institutions out of the total sample, or 83 percent, have been accredited by both national and regional associations.

METHOD

A questionnaire was directed to deans of the undergraduate and graduate faculties (exclusive of departments and faculties of public health, medicine, and hygiene [7]) of liberal arts colleges and universities,[8] to registrars, to the chairmen and professors of various departments, and to other executive or administrative officers. The following information was sought.

1. Are any courses or parts of courses devoted to the following subjects:
   a. The economic, social, and psychological problems of public health and medical care?
   b. Collective attempts to solve these problems (public health legislation and tax-supported medical care, voluntary and compulsory health insurance)?
   c. The history of medicine and public health in relation to society?
2. Full courses offered:
   a. Name of course.
   b. Subject matter listed under 1, *a* to *c*, covered.
   c. Department or faculty in which given.
   d. Quarter, semester, or full year.
   e. Undergraduate or graduate.

[4] Educational Directory 1940. Part III, Colleges and Universities. Bulletin 1940, No. 1. U. S. Office of Education, Washington, 1939.

[5] This does not include professional schools, teachers colleges, normal schools, junior colleges, and the like.

[6] *Cf.* Educational Directory 1940, also Accredited Higher Institutions, published by U. S. Office of Education, for the method and significance of accrediting.

[7] Those courses in hygiene, given in the physical education department or other departments and forming an integral part of the liberal arts curriculum, are included. The exclusion refers to those courses given in professional schools of hygiene.

[8] By agreement, the names of these institutions are not mentioned in this report.

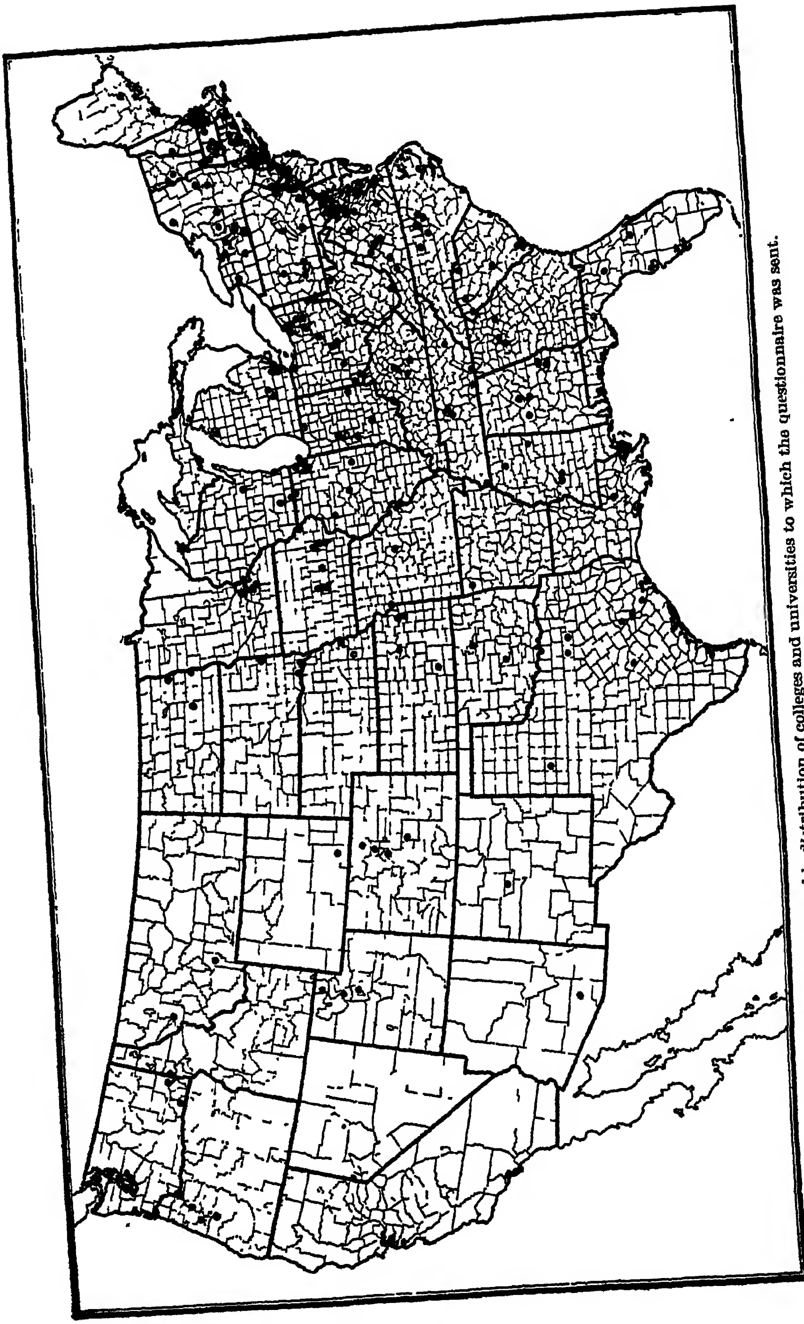

FIGURE 1.—Geographic distribution of colleges and universities to which the questionnaire was sent.

3. Parts of courses offered:
   a. Name of course.
   b. Subject matter listed under 1, *a* to *c*, covered.
   c. Hours devoted to this subject matter.
   d. Department or faculty in which given.
   e. Quarter, semester, or full year.
   f. Undergraduate or graduate.

Before sending the questionnaire, the 1939–40 catalogs of the institutions were studied for descriptions of courses and parts of courses that might be devoted to the general subject of social medicine. To this body of data were added the replies to the questionnaires. A final check of the catalogs was then made in order to determine whether the courses described qualified for consideration in this study.

GENERAL FINDINGS

Of the 230 colleges and universities which were canvassed, 177, or 77 percent, replied.[9] One hundred and thirty-nine, or 78.5 percent, of the responding institutions stated that one or more full or part courses in social medicine were offered. Three of these schools also encouraged special work in the field, i. e., discussion groups and medical economics research projects. Thirty-six schools, or more than 20 percent of the responding institutions, stated that no consideration was given to the subject. Two schools, although not offering courses on social medicine during 1939–40, reported that they were taking on instructors to give courses in the field during the 1940–41 school year. A letter from a professor in one of these schools stated: "It is impossible to teach modern public health without teaching economic and social problems."

A total of 715 courses covering one or more topics on social medicine was offered by 139 colleges and universities. One hundred and twelve of these were full courses devoted to social medicine subject-matter, and in the remaining 603, similar topics were taught only in parts of the course.

The 112 courses devoting more than incidental interest to the subject, i. e., full courses offered per semester, quarter, or year, were offered in only 63 institutions, or 35 percent of the schools which responded to the questionnaire. Moreover, 256, or 42 percent, of the 603 additional courses which devoted part time to the subject-matter mentioned in the questionnaire, were given in the same group of 63 schools reporting the total number of full courses. In other words, the major effort of formal teaching in the content of social medicine (100 percent of the full courses and 42 percent of the parts

[9] Nineteen additional replies were received after the analysis of data was already under way. Hence they have not been included in this study.

of courses) was concentrated in slightly more than one-third (35 percent) of the responding institutions. This fact would indicate more than any other measure at our disposal the extent to which these subjects are being taught in colleges and universities in the United States.

FULL COURSES IN SOCIAL MEDICINE

As used in this study, the term "full course" refers to any course given per quarter, semester, or year which is devoted *entirely* to one or more aspects of social medicine as listed in the questionnaire under 1, *a* to *c*. Depending largely upon the department in which the full course is given, emphasis on the particular subjects varies. Irrespective of departments, however, all full courses to a greater or lesser degree cover the various subjects under 1, *a* to *c*.

Table 1 analyzes the 112 full courses on social medicine according to the departmental framework in which they are given and according to the students eligible to take them. Courses open to undergraduate students only, 62 in number, predominate. Three-fourths of the undergraduate courses, interestingly enough, are given in the biological sciences and in physical education and hygiene.

TABLE 1.—*An analysis of full courses on any of the several aspects of social medicine given at 63 colleges and universities, by department, for undergraduates, graduates, and both*

Number of courses	Department in which given	Undergraduate	Graduate	Both
20	Biological sciences [1]	13	3	4
0	Economics	0	0	0
6	Education [2]	3	0	3
1	Government and political science [3]	1	0	0
0	History	0	0	0
1	Home economics	1	0	0
38	Physical education and hygiene [4]	34	0	4
2	Psychology	1	0	1
27	Social work [5]	2	17	8
13	Sociology [6]	4	5	4
4	Other	3	0	1
112		62	25	25

[1] Includes those departments in the colleges and universities which are listed variously as bacteriology, biology, botany, medicine, physiology, preventive medicine, public health, sanitation, science, and zoology.
[2] Includes also health education.
[3] Includes also public administration.
[4] Includes also health.
[5] Includes also applied social science, applied social welfare, public welfare administration, social administration, and social welfare.
[6] Includes also social science.

Twenty-five of the full courses are open to both undergraduates and graduates, and another 25 are given only for graduate students. More than half of the graduate courses are given in social work and, for the most part, should be considered preparatory for professional work in that field.

More than 87 percent of the full courses are given in four major departments: Biological sciences, physical education and hygiene,

social work, and sociology. One-third of the courses, in fact, are given in physical education and hygiene. This predominance is not surprising since a great many colleges and universities require students seeking a liberal arts degree to take one or more courses in this division. In fact, according to a study of the United States Office of Education,[10] 22 percent of all colleges and universities in the United States report a required course in personal or community hygiene.

As previously stated, those courses on social medicine given in the division of social work are of a professional character. Most of the courses called "medical information" or the like are intended primarily for students who will become social workers or medical social workers. In a sense, the social worker is the technician of the social sciences; hence, his training must be practical. To a large extent, the courses in social medicine given in the division of social work exhibit this character. Comprising basic principles, they have little of the theoretical and much of the practical.

The courses on social medicine offered in the biological sciences range from the theoretical to the practical; most of them include laboratory and field instruction, in addition to the traditional lectures. Like instruction in the division of sociology, the biological science courses cover the general field. The differences, as we pointed out earlier, are of emphasis only.

As shown in table 1, the absence of courses on social medicine in departments of economics is striking. This lack is all the more conspicuous when one considers the vast literature [11] on the costs of medical care; the economic consequences of accidents, disability, and death; the distribution of medical facilities and personnel and their money values; the relationship of poverty and disease, housing and health; health insurance and workmen's compensation; and numerous other subjects that are relevant to the teaching of economics. These topics are taught only to a limited extent even in parts of courses, as is shown in the following sections.

It is equally surprising to find only one course offered in the division of government and political science. As in the medical-economic literature, there is a vast array of information that can be taught properly in this division and that is covered partially in parts of courses. The administration of public health and public medical services on the Federal, State, and local levels, and the historical and administrative aspects of compulsory and voluntary health insurance systems are but a few of the subjects that would fall within the sphere of this division's work.

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[10] Rogers, J. F.: Instruction in Hygiene in Institutions of Higher Education. Bulletin 1936, No. 7, U. S. Office of Education, Washington, 1936.

[11] A select bibliography has been compiled by the Informational Section, Division of Sanitary Reports and Statistics, U. S. Public Health Service, and is intended as a guide to those interested in the literature.

In the United States, Professors Sarton of Harvard and Sigerist of Johns Hopkins have long advocated the need for teaching the history of science, medicine, and public health. They conceive of such courses not merely as ends in themselves but also in their relationship with other courses and disciplines. In general, they agree on the thesis implicit in this study and stated specifically elsewhere [12] that these historical courses must show the interrelationships of science, public health, and medicine with society. Table 1 shows that not a single institution devotes a full course to these subjects.

Home economics is, comparatively speaking, a newcomer among liberal arts disciplines. Its boundaries and the scope of its courses are still undefined. Many courses, however, deal with practical, everyday problems that affect home life. What could approximate more closely such practical considerations as the costs of medical care; methods of choosing a physician, dentist, nurse, or a hospital; medical resources available in the community; and legislative attempts proposed to solve the problems of medical care? Yet only one full course is devoted to these subjects.

Finally, we come to the departments of psychology, in which only two full courses were reported. Recognition of the relation between mental conditions and physical well-being and efficiency is only just emerging as a well-defined concept in medicine, public health, and social work. The mental hygiene movement is only a quarter of a century old, and, more significantly, the newer contributions of psychiatry and mental hygiene have scarcely touched education at any level. There is, nevertheless, a sufficient body of material and a great enough need to warrant more teaching in these fields. Moreover, the problem of mental disorder in modern society, the care of the mentally ill and handicapped, and the amelioration of individual and group problems through psychotherapy are old stories.

The number of courses reported by departments of education is negligible, both in full courses and in parts of courses. Only 14 courses, 6 full and 8 part, were reported.

PARTS OF COURSES DEVOTED TO SOCIAL MEDICINE

More than 1,000 courses devoting one or more lectures to any of the several aspects of social medicine were reported in replies to the questionnaire. Because a number of these "treated the subjects incidentally," it became obvious that some index would have to be set up for defining and considering a course as one which covers the subject matter of social medicine in part. It was decided, therefore, to include only those courses, henceforth referred to as parts of courses,

[12] Sand, R.; Health and Human Progress. Macmillan, New York, 1936.

which devoted 3 or more lectures to social medicine per quarter or semester, and 6 or more lectures per year. On this basis, more than 400 courses were excluded, leaving 603 parts of courses for consideration.

Table 2 analyzes these courses according to the departmental framework in which they are given and in terms of the students eligible to take them. Like full courses, the parts of courses on social medicine are predominantly undergraduate. Three hundred and ninety-seven are offered for this group. Only 89 are wholly graduate courses, and more than half of these are offered in the division of social work. One hundred and seventeen are open to both undergraduate and graduate students.

TABLE 2.—*An analysis of parts of courses on any of the several aspects of social medicine given at 133 colleges and universities, by department, for undergraduates, graduates, and both*

Number of courses	Department in which given	Undergraduate	Graduate	Both
60	Biological sciences [1]	50	2	8
80	Economics	51	8	21
8	Education [2]	5	0	3
41	Government and political science [3]	29	1	11
10	History	8	0	2
7	Home economics	6	0	1
67	Physical education and hygiene [4]	51	13	3
36	Psychology	26	4	6
71	Social work [5]	12	49	10
211	Sociology [6]	151	12	48
12	Other	8	0	4
603		397	89	117

[1 2 3 4 5 6] See footnotes to table 1.

Sixty-eight percent of the parts of courses was given in the four departments which absorbed 87 percent of the full courses, namely, biological sciences, physical education and hygiene, social work, and sociology. Three other departments (economics, government and political sciences, and psychology) reported 26 percent of the parts of courses, although these departments were either not represented at all or only negligibly in the full courses. (See table 1.)

All of the major departments or divisions represented in this study show an increase in the number of parts of courses over the number of full courses reported by them. As seen in table 2, the teaching of social medicine through the introduction of the subject matter into courses not specifically devoted thereto varies markedly from department to department. The number of parts of courses is less than twice that of full courses in some departments; in other departments, nearly 20 times as many parts of courses are reported as full courses; and in still others, the increase is even more striking. Among the seven departments mentioned above, which absorb 94 percent of the

parts of courses, the departments of sociology report 211 parts of courses, or more than 16 times the number of full courses reported by them. Departments of economics, government and political sciences, and psychology, which offered no full courses or not more than two, reported the introduction of pertinent topics into 80, 41, and 36 parts of courses, respectively.

No full courses on the history of medicine and public health were offered by any of the departments of history, and only ten courses admitted giving some attention to this subject. One of the three major areas of interest in the general field of social medicine as defined in the questionnaire is the history of medicine and public health. That this subject should qualify as a requirement in liberal arts education, as well as in professional training, is supported by the opinions of scientists, educators, and physicians. Indeed, their demands for the incorporation of the history of science and medicine with general historical teaching have become emphatic in recent years. Noteworthy among these voices is that of Dr. James P. Warbasse, who was the originator of the first course on medical sociology to be given in a medical school in the United States. In his book, "The Doctor and the Public," he points directly to the crux of the problem when he says:

> College graduates know much of Charles VIII, Henry VIII, Louis XIV, and Napoleon, who did more to spread syphilis over Europe than any other four men in the world. But they scarcely know the names of Metchnikoff, Schaudinn, Ehrlich and Wassermann, who did more than any other four men in the world to stop the disease.[13]

And again, pleading for wider knowledge of medical history, he continues:

> The historical events that are emphasized in our modern education are political, economic, social, and religious. Finally come science and art. Chauvinistic prejudice in favor of each country requires that young people learn the names of their country's politicians and the dates connected with their various acts as well as the dates of wars and battles. Medicine is practically left out of school history to make place for these other matters. Still the history of medicine is a part of all history, quite as much as politics, commerce, exploration, and war—and a bit more intimate.
>
> Certainly the events and the people who have affected the course of affairs are important, whether good or bad. But medicine also has profoundly influenced history, and its results have been largely beneficient. There is not only a cultural value but a practical use in a knowledge of medical history. This embraces knowledge of the great characters of medicine, the salient events of medicine, and the medical discoveries that have affected society.[13]

[13] Warbasse, J. P.: The Doctor and the Public. Hoeber, New York, 1935.

THE CONTENT OF COURSES IN SOCIAL MEDICINE

Thus far we have reported on the number of part and full courses in social medicine available in 139 colleges and universities for undergraduate and graduate students and on the departments in which they are given. We come now to a consideration of the content of these courses. In the following section, an attempt has been made to coordinate the information on content afforded by the questionnaires and by descriptions in the college catalogs.

Topics have been listed according to the departments in which they are covered and in descending order of the frequency with which they were mentioned in the questionnaires and catalogs. The language of the catalogs and replies to questionnaires has been edited so that broad topics could be treated in tabular form. Wherever possible, the original language has been retained. The total number of topics covered in 715 courses is 35. In the accompanying list, it will be seen that although the same topics appear in the several departments and divisions, the essential differences are that: (1) The frequency with which a topic is mentioned varies in different departments, and (2) certain topics appear in particular departments and not in others. The list shows further whether these topics are treated in full courses or parts of courses.

Although it was not the intent of this study to explore the teaching of technical subjects such as sanitary science and the epidemiology of communicable diseases, nor of personal and family hygiene in its many aspects, a considerable number of courses reported in the questionnaires as germane to the study do, in fact, cover these topics. Similarly, the broad field of health education, both public and individual, was reported by the colleges as a topic for teaching in social medicine. While it is true that these topics are essential factors in any consideration of human health, these specific areas are not within the scope of social medicine as defined in the present study. Since it is clear that many colleges identify these topics with the limited scope of social medicine as defined in the questionnaire, we have therefore included such topics in the accompanying list and table, realizing the limitations of the questionnaire method and of the resulting data.

	Full courses	Parts of courses	Total
BIOLOGICAL SCIENCES (20 FULL COURSES; 60 PARTS OF COURSES)			
1. Environment and health	20	53	73
2. Water, sewerage, milk, etc., sanitation and control	17	52	69
3. Communicable diseases, causes and methods of control	3	57	60
4. Relationships of individual and home hygiene with community health	18	37	55
5. Food and drug control	19	30	49
6. Public health laws	11	33	44
7. Public health administration and organization	14	29	43
8. Problems and issues of medical care	16	22	38
9. Costs of medical care	15	22	37
10. Voluntary health insurance	17	20	37
11. Compulsory health insurance	17	20	37
12. Social and economic problems affecting public and individual health	19	17	36
13. Morbidity and mortality statistics	5	21	26
14. Social hygiene	9	16	25
15. Industrial hygiene, general	6	18	24
16. Mental hygiene, personal	7	15	22
17. Emotional problems affecting health and disease	14	8	22
18. History of medicine and public health	9	11	20
19. Health education	2	9	11
ECONOMICS (NO FULL COURSES; 80 PARTS OF COURSES)			
1. Industrial hygiene, general	0	64	64
2. Workmen's compensation	0	58	58
3. Industrial accidents	0	57	57
4. Social and economic problems affecting public and individual health	0	42	42
5. Health insurance, general	0	39	39
6. Public health administration and organization	0	34	34
7. Voluntary health insurance	0	30	30
8. History of medicine and public health	0	7	7
EDUCATION (6 FULL COURSES; 8 PARTS OF COURSES)			
1. Relationships of individual and home hygiene with community health	4	8	12
2. Communicable diseases, causes, and methods of control	5	6	11
3. Social and economic problems affecting public and individual hygiene	6	4	10
4. Public health, general	2	8	10
5. Problems and issues of medical care	5	4	9
6. Public health administration and organization	3	4	7
7. Mental hygiene, personal	2	4	6
8. Social hygiene	3	2	5
9. Water, sewerage, milk, etc., sanitation and control	1	2	3

	Full courses	Parts of courses	Total
GOVERNMENT AND POLITICAL SCIENCE (1 FULL COURSE; 41 PARTS OF COURSES)			
1. Public health laws	0	35	35
2. Public health administration and organization	1	30	31
3. Social and economic problems affecting public and individual health	1	22	23
4. Health insurance, general	1	21	22
5. Costs of medical care	1	18	19
6. History of medicine and public health	0	8	8
7. Water, sewerage, milk, etc., sanitation and control	1	5	6
HISTORY (NO FULL COURSES; 10 PARTS OF COURSES)			
1. Social and economic problems affecting public and individual health	0	8	8
2. History of medicine and public health	0	7	7
3. Health insurance, general	0	4	4
4. Public health laws	0	1	1
HOME ECONOMICS (1 FULL COURSE; 7 PARTS OF COURSES)			
1. Maternal and child health problems	1	7	8
2. Medical care problems of the family	1	6	7
3. Health insurance, general	0	5	5
4. Public health, general	1	4	5
PHYSICAL EDUCATION AND HYGIENE (38 FULL COURSES; 67 PARTS OF COURSES)			
1. Relationships of individual and home hygiene to community health	37	34	71
2. Personal hygiene	28	43	71
3. Maternal and child health problems	23	38	61
4. Community health problems	20	40	60
5. Social and economic problems affecting public and individual health	21	35	56
6. Emotional problems affecting health and disease	18	37	55
7. Health education	24	27	51
8. Costs of medical care	19	31	50
9. Social hygiene	6	42	48
10. Environment and health	33	14	47
11. Communicable diseases—cause and control	15	31	46
12. Health insurance, general	12	29	41
13. Water, sewerage, milk, etc., sanitation and control	7	30	37
14. Public health administration and organization	14	19	33
15. Public health, general	10	17	27
16. Rural hygiene	6	18	24
17. Morbidity and mortality statistics	2	21	23
18. History of medicine and public health	5	13	18
19. Industrial hygiene, general	9	6	15
20. Public health laws	1	8	9

	Full courses	Parts of courses	Total
PSYCHOLOGY (2 FULL COURSES; 36 PARTS OF COURSES)			
1. Emotional problems affecting health and disease	2	31	33
2. Mental hygiene, personal	2	28	30
3. Social diagnosis and treatment of mental and nervous disorders	0	24	24
4. Public care of mentally ill and handicapped	1	17	18
5. Social and economic problems affecting public and individual health	2	14	16
6. Health insurance, general	0	13	13
7. Psychology and psychotherapy applied to medical, public health, and social problems	1	11	12
8. Public health administration and organization	1	5	6
9. History of medicine and public health	2	4	6
SOCIAL WORK (27 FULL COURSES; 71 PARTS OF COURSES)			
1. Social implications and programs for specific diseases and conditions	25	63	88
2. Emotional problems affecting health and disease	22	57	79
3. Diseases frequently encountered in social work	27	51	78
4. Social and economic problems affecting public and individual health	15	60	75
5. Workmen's compensation	18	54	72
6. Costs of medical care	21	43	64
7. Public health administration and organization	9	51	60
8. Health insurance, general	12	37	49
9. Medical care problems of the family	16	33	49
10. Voluntary health agencies and resources	17	28	45
11. Interrelations of medical and social work	6	31	37
12. History of medicine and public health	8	14	22
SOCIOLOGY (13 FULL COURSES; 211 PARTS OF COURSES)			
1. Medical care problems of the family	13	169	182
2. Social and economic problems affecting public and individual health	13	147	160
3. Costs of medical care	13	128	141
4. Health insurance, general	11	108	119
5. Voluntary health insurance	8	105	113
6. Morbidity and mortality statistics	5	64	69
7. Public health administration and organization	9	47	56
8. Workmen's compensation	12	35	47
9. History of medicine and public health	4	21	25
10. Social hygiene	7	13	20
11. Water, sewerage, milk, etc., sanitation and control	2	6	8

	Full courses	Parts of courses	Total
OTHER (4 FULL COURSES; 12 PARTS OF COURSES)			
1. Public health, general	2	7	9
2. Industrial hygiene, general	3	4	7
3. Social and economic problems affecting public and individual health	1	5	6
4. History of medicine and public health	0	3	3
5. Health insurance, general	1	2	3

Although many departments reported only a few topics as being discussed in their courses and others mentioned as many as 20, it is possible to compare the relative emphasis placed upon specific topics in the several departments by assigning to them a rank in terms of the frequency with which particular departments mentioned the topic. This is shown in table 3.

TABLE 3.—*Analysis of topics in 715 full and parts of courses by frequency in total number of courses and by rank attained in various departments and divisions*

Total frequency	Topic	Rank	Rank by departments[1]										
			BS	Ec	Ed	GP	H	HE	PE	P	SW	S	O
432	Social and economic problems affecting public and individual health	1	12	4	3	3	1	0	5	5	4	2	3
311	Costs of medical care	2	9	0	0	5	0	0	8	6	6	3	0
295	Health insurance, general	3	0	5	0	4	3	3	12	0	8	4	5
270	Public health administration and organization	4	7	6	6	2	0	0	14	8	7	7	0
238	Medical care problems of the family	5	0	0	0	0	0	2	0	0	9	1	0
189	Emotional problems affecting health and disease	6	17	0	0	0	0	0	16	1	2	0	0
180	Voluntary health insurance	7	10	7	0	0	0	0	0	0	0	5	0
177	Workmen's compensation	8	0	2	0	0	0	0	0	0	5	8	0
138	Relationships of individual and home hygiene with community health	9	4	0	1	0	0	0	1	0	0	0	0
123	Water, sewerage, milk, etc., sanitation and control	10	2	0	9	7	0	0	13	0	0	11	0
120	Environment and health	11	1	0	0	0	0	0	10	0	0	0	0
118	Morbidity and mortality statistics	12	13	0	0	0	0	0	17	0	0	6	0
117	Communicable diseases. causes and methods of control	13	3	0	2	0	0	0	11	0	0	0	0
116	History of medicine and public health	14	18	8	6	0	2	0	18	9	12	9	4
111	Industrial hygiene, general	15	15	1	0	0	0	0	19	0	0	0	2
98	Social hygiene	16	14	0	8	0	0	0	9	0	0	10	0
89	Public health laws	17	6	0	0	1	4	0	20	0	0	0	0
88	Social implications of and programs for specific diseases and conditions	18	0	0	0	0	0	0	0	0	1	0	0
78	Diseases frequently encountered in social work	19	0	0	0	0	0	0	0	0	3	0	0
71	Personal hygiene	20	0	0	0	0	0	0	2	0	0	0	0
69	Maternal and child health problems	21	0	0	0	0	0	1	3	0	0	0	0
62	Health education	22	19	0	0	0	0	0	7	0	0	0	0
60	Community health problems	23	0	0	0	0	0	0	4	0	0	0	0
58	Mental hygiene, personal	24	16	0	7	0	0	0	0	2	0	0	0
57	Industrial accidents	25	0	3	0	0	0	0	0	0	0	0	0
51	Public health, general	26	0	0	4	0	0	4	15	0	0	0	0
49	Food and drug control	27	5	0	0	0	0	0	0	0	0	0	0
47	Problems and issues of medical care	28	16	0	5	0	0	0	0	0	0	0	0
45	Voluntary health agencies	29	0	0	0	0	0	0	0	0	10	0	0

See footnote at end of table.

TABLE 3.—*Analysis of topics in 715 full and parts of courses by frequency in total number of courses and by rank attained in various departments and divisions*—Con.

Total frequency	Topic	Rank	Rank by departments										
			BS	Ec	Ed	GP	H	HE	PE	P	SW	S	O
37	Compulsory health insurance	30	11	0	0	0	0	0	0	0	0	0	0
37	Interrelations of medical and social work	31	0	0	0	0	0	0	0	0	11	0	0
24	Rural hygiene	32	0	0	0	0	0	0	16	0	0	0	0
24	Social diagnosis and treatment of mental and nervous disorders	33	0	0	0	0	0	0	0	3	0	0	0
18	Public care of mentally ill	34	0	0	0	0	0	0	0	4	0	0	0
12	Psychology and psychotherapy applied to medical, public health, and social problems	35	0	0	0	0	0	0	0	7	0	0	0

[1] BS=biological sciences; Ec=Economics; Ed=education; GP=government and political science; H=history; HE=home economics; PE=physical education and hygiene; P=psychology; SW=social work; S=sociology; O=other departments.

Thus, "social and economic problems affecting public and individual health" has the highest total frequency; hence, it ranks first in the list of 35 topics. However, this topic ranks twelfth in departments of biological sciences, which reported no less than 19 topics, and first in history departments, which reported only 4 topics.

The number of departments in which a topic is introduced does not determine the frequency with which it is taught in the group of institutions. For example, the topic "medical care problems of the family" is mentioned in only three departments, yet it ranks fifth in total frequency. On the other hand, "history of medicine and public health" is reported by 9 or more departments but ranks fourteenth in the frequency with which it is mentioned in 715 full and part courses.

Sixteen, or 45.7 percent, of the 35 topics are covered in only one or two departments. All of these topics rank below seventeenth in total frequency, and the majority of them are concerned with problems specific to the general subject-matter of the departments which cover them, as "personal hygiene" in departments of physical education and hygiene; "industrial accidents" in departments of economics; and "psychology and psychotherapy applied to medical, public health, and social problems" in departments of psychology. Some of these infrequently mentioned topics, on the other hand, are, in fact, parts of broader topics given in a number of departments, but treated by some departments as separate topics. For example, "compulsory health insurance" is treated as a separate topic by biological sciences, although it is obviously discussed under "health insurance, general" in other departments. "Rural hygiene" and "community health problems" are treated as separate topics by departments of physical education and hygiene, but are undoubtedly particularizations of the broader topic, "public health, general."

EXAMPLES OF COURSES ON SOCIAL MEDICINE

The following descriptions of six courses reported in the study were selected at random and are duplicated herein to indicate the scope of the subject-matter in social medicine. With the possible exception of the last example cited, these courses illustrate the channeling of the subject-matter which has been indicated in the data, and the resulting gaps in a broad approach to the subject.

In an undergraduate course in labor security (economics) at one southern university, the following topics are covered in approximately ten class hours:

1. European experience and history of voluntary and compulsory health insurance. History of voluntary insurance schemes (including hospitalization) and public provisions for medical care in the United States. Public health provisions of the Federal Social Security Act. Public health program of the State.

A western university offers a number of courses on social medicine to both undergraduate and graduate students. Two undergraduate courses in the department of physical education and hygiene and one graduate course in sociology cover the following material:

1. The general field of public health work in the United States is surveyed. Consideration is given the economic and social causes of death, sickness, and disability; the conservation of infant, child, and maternal life; health problems of the home and industrial environment; chronic diseases; the need for and methods employed in health instruction.
2. The history of community effort for the care of the sick and disabled is related to the origins of the public health movement in the United States. The organization and administration of Federal, State, and local agencies is reviewed thoroughly.
3. Health aspects of social pathology are considered from the individual, family, and community points of view. Poverty, malnutrition, and housing as pathological conditions are related to disease. The economic consequences of disability, the costs of medical care, and ability to meet these costs are related to needs. Programs for the amelioration of these problems are reviewed.

A well-known college for women in the East offers several undergraduate courses. In one of these, a course in physiology and hygiene, the following topics are covered:

1. Historical development of present medical practice as a basis for good medical care. Other questions discussed are: How to choose a physician and what one has a right to expect from him. Why medical services cost so much. Devices available for deferred and budgeted payment. Extracurricular activities, i. e., research projects, discussions, attendance at medical and industrial meetings are encouraged.

The liberal arts college of a large midwestern university offers an undergraduate course in human biology, which integrates, as nearly as possible, all facets of the subjects with which we are concerned.

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1. The course is designed first, to acquaint students with fundamental biological laws, i. e., the nature of living and nonliving matter; second, to impart an understanding of man as a biological animal, i. e., essentials in human body structure, physiology, hygiene, and disease; third, to educate in matters of individual and community health. On the biological level, the students are taught the importance of the biological aspects of agriculture, horticulture, animal and plant husbandry, game preservation, lumbering, etc., and man's relationship to such practical applications for healthful, mental, and physical living. On the sociological level, the problems of man, the biological and social animal, are related to their economic and eugenic setting. The basis of such teaching revolves about "the preservation of health, the proper rearing of children, the feeding of a nation, technological unemployment—in fact, the entire basis of rational adjustments between man and his environment—[which] involve applications of fundamental biological laws." [14] After a considerable foundation in the study of man's anatomy, physiology, and pathology and a comprehensive view of his nature and orientation in a natural world, the student is brought to the threshold of individual and community health problems. "In laying this foundation, we first consider general morbidity and mortality and statistics representing certain indices of health. * * * Following the general consideration of the many factors influencing individual susceptibility and resistance to disease, we settle down to attack the community aspects of health, the costs of medical care, etc. *Throughout, we attempt to show how deeply medical care interweaves with many fields and how many aspects are present in immediate medical prevention and treatment problems.* After a careful study of the interweaving economic, social, psychological, and biological aspects of special disease problems, such as tuberculosis, syphilis, cancer, and heart disease, the students are then ready to learn about health and welfare organization at the local, State, and Federal levels. With this background, they are prepared to discuss more fully the economic and social problems of medical care and the various proposals (compulsory health insurance schemes, voluntary insurance schemes for medical and hospital care, etc.) that have been made. [15]

SUMMARY

1. Two hundred and thirty accredited colleges and universities in the United States were canvassed to determine (1) the extent to which social medicine was being taught and (2) the content of courses offered in this field. One hundred and seventy-seven of these institutions replied; 139 reported one or more full courses or parts of courses; 36 reported no courses; and 2 stated that plans had been formulated to give such courses in the 1940–41 school year.

2. A total of 715 courses was reported by 139 institutions; 112 were full courses and 603 were parts of courses.

3. Sixty-three, or 35 percent, of the responding institutions offered the 112 full courses and these same institutions offered 256, or 42 percent, of the 603 parts of courses.

4. More than half of the full courses and two-thirds of the parts of courses were offered for undergraduate students only.

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[14] Quotation taken from the 1939–40 catalog of the college.

[15] Excerpts from correspondence with the professor who gives the course.

5. More than 87 percent of the full courses were offered in four major departments, biological sciences, physical education and hygiene, social work, and sociology; while 94 percent of the parts of courses were offered in seven departments, i. e., the above-mentioned departments and economics, government and political science, and psychology.

6. Thirty-five topics were mentioned in the descriptions of the 715 courses found in the questionnaires and catalogs. Nineteen of these topics were covered in three or more departments and the remaining topics were mentioned by only one or two.

COMMENT

The response of the institutions canvassed in this study is a significant indication of the general current interest in social medicine. Within 10 days after the initial mailing of questionnaires, 140 of the 177 responding institutions had replied. This is particularly striking because the questionnaires were sent at a time (the late spring) when administrative and teaching staffs are usually heavily burdened with tasks connected with the close of the school year. Such a response of itself would indicate a lively interest on the part of cooperating institutions. In addition, a considerable number of letters, commenting on the need for teaching the subjects and requesting materials for study and copies of the final report of this study, accompanied the returned questionnaires.

An impressive indication of the interest in teaching these subjects is found in the existence of 112 full courses and 603 additional courses which give partial attention to particular topics in the field. However, the concentration of the entire group of full courses and of a large proportion of the parts of courses in a relatively small group of institutions suggests a considerable lack of attention to social medicine in liberal arts colleges. Moreover, the fact that the same particular topics may be offered in several departments of a single institution, or in several courses in a single department suggests that, on the whole, the subject-matter of social medicine has crept into the curricula of colleges and universities, rather than having been placed there as a result of planned effort.

In a recent paper Prof. C. C. Barnes [16] holds that if education is to be functional and useful, new fields must be explored, expanded, and introduced into the curriculum. In every field of learning, the formal introduction of new subject-matter into college teaching occurs in response to active interest and demand. The response customarily lags behind interest until the new subject has been informally intro-

[16] Barnes, C. C.: The challenge to the social studies. Social Education, Vol. 3, No. 2, February 1939

duced and a pattern of emphasis and instruction has already been formed. It would appear from the findings of this study that some such development in the teaching of social medicine is occurring in colleges and universities of the United States. Some of the courses reported in our study appear to grow out of the interests of individual institutions, of individual departments, and of individual instructors. Others are oriented toward a broader approach, and still others are the result of cooperative endeavor on the part of several faculties. It is not the province of the authors to determine whether all of these approaches should be applied, or whether one is more or less effective than the other. These are problems of method which educators alone are equipped to solve. In exploring the content of new fields, however, the educator should expect and should receive the whole-hearted cooperation of qualified workers in the health fields.

The data presented in this study are somewhat limited, and suggest further exploration in this field with special reference to (1) the content of the courses, (2) the quality of the teaching, (3) the materials used, and (4) the number and academic status of the students reached. The method of the study itself does not permit a true picture of the content of the courses. Likewise, it is impossible from these data to estimate the number of students reached by the courses offered or to indicate the undergraduate years—freshman, sophomore, junior, or senior—in which the courses are made available. In view of the varying degrees of maturity among students in different college years, no opinions can be formed as to the relative value of different types of courses in the preparation of students to meet the problems expressed in social medicine, either as citizens or as professional people in later years.

More and more, young people of college age are being drawn into active participation in the life of our civilization. As young individuals, many of them are already facing some of the problems discussed in this study. As they grow older, theirs will be the responsibility of solving such problems, not only for themselves and their families, but for their fellow-citizens as well. It therefore devolves upon educators and other professions to meet in joint effort to plan for the younger generation and to prepare them for responsible leadership in fields of mutual interest.

ACCIDENTS IN THE URBAN HOME AS RECORDED IN THE NATIONAL HEALTH SURVEY*

By Rollo H. Britten, *Senior Statistician*, Joan Klebba, *Junior Statistician, and* David E. Hailman, *Senior Administrative Assistant, United States Public Health Service*

The National Health Survey [1] (1935–36) included on its schedule questions relating to serious accidents which had occurred in the home during the 12 months immediately preceding the enumerator's visit. Over 700,000 urban households in the United States were covered. The survey followed established techniques, employing trained enumerators to obtain the information from the housewife or other responsible member of the household.

The data collected on home accidents in this survey fulfill a definite need. Although the Bureau of the Census has published data on deaths from home accidents for every year since 1935, it has not, of course, gathered information on accidents which did not result in death. For many years the only published statistics on nonfatal home accidents were compiled from records of safety organizations. Information from such records is not always representative of the total population.

The present report summarizes material collected on home accidents among 2,498,180 white and colored persons of known age, or 3.6 percent of the urban population of the United States (1930), [2] and presents: (*a*) Frequency of home accidents disabling for 1 week or more, by age, sex, economic status, employment status, and means of injury, days of disability per case and annual days of disability per person observed, by age, and (*b*) prevalence of impairments caused by home accidents, by means of injury and age.[3]

FREQUENCY AND SEVERITY OF HOME ACCIDENTS

Definition of home accident.—Events which fulfilled certain requirements as to type, place of occurrence, and resulting disability were

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[1] Perrott, George St. J., Tibbitts, Clark, and Britten, Rollo H.: The National Health Survey: Scope and method of a Nation-wide canvass of sickness in relation to its social and economic setting. Pub. Health Rep., 54: 1663 (1939). Reprint No 2098.

[2] The sample was chosen to be representative in general of cities in the United States according to region and size. In large cities (100,000 and over) the population to be canvassed was determined by a random selection of many small districts based on those used in the U. S. Census of 1930. In the smaller cities selected for study the population was enumerated completely. See article by Perrott, Tibbitts, and Britten cited in footnote 1 for a more detailed account of the sampling procedure and a comparison of certain characteristics of the population enumerated with those of the urban population as a whole (Census, 1930).

[3] For a summary of data obtained on illnesses and accidents, see Britten, Rollo H., Collins, Selwyn D., and Fitzgerald, James S.: The National Health Survey: Some general findings as to disease, accidents, and impairments in urban areas. Pub. Health Rep., 55: 444 (1940). Reprint No. 2143.

recorded in the National Health Survey as home accidents.[4] These requirements were:

(1) The event must have occurred suddenly and caused bodily injury. In addition to the means of injury (or death) commonly thought of in connection with accidents (such as falls, burns, and cutting or piercing instruments), many other means (such as poisonous foods, poisonous gases, injuries by animals, mechanical suffocations, and drownings) are included, but not nonaccidental injuries received in brawls and suicidal attempts.

(2) The place of occurrence must have been in a dwelling or on residential property.[5]

(3) The event must have resulted in disability (that is, inability to work, attend school, care for the home, or engage in other customary activity) lasting 1 week or more within the 12 months immediately preceding the visit, or in hospitalization or death.[6]

Frequency of home accidents.—As reported in the National Health Survey, the annual frequency of accidents in the urban home (sole, primary, and contributory causes) [7] which disabled for 1 week or more was 4.65 per 1,000 persons,[8] or 2.7 percent of all cases of disability lasting 1 week or longer (from disease and accident). The total rate for accidents (all places of occurrence) was found to be 16.0 per 1,000 persons, of which 29 percent were home accidents, 24 percent occupational accidents, 20 percent automobile accidents, 21 percent other public accidents, and 6 percent accidents unspecified as to place of occurrence.

Particularly because of a certain amount of underreporting for the less severe accidents, the rate for home accidents disabling for a month or more should be considered. This rate was 2.52 per 1,000 persons. In other words, about 1 out of 400 persons was disabled for a month or

[4] For accidents (and for impairments resulting from accidents) the enumerator entered on the schedule the means of injury (such as burns, falls, etc.) and whether the accident occurred at home, at work, or in a public place. The 1929 Revision of the International List of the Causes of Death, with some modifications, was used as a basis for classification of means of injury as recorded by the enumerator.

[5] Not included as home accidents are those sustained, while on duty, by gainfully employed persons other than domestic servants.

[6] Accidents causing disability on the day of the interview (whether or not the period of disability had attained a duration of 1 week or more) were also recorded. Thus, two indices of the frequency of home accidents are obtainable: (*a*) An annual frequency rate of periods of disability of 1 week or more, and (*b*) the proportion of persons disabled on the day of the visit, but only the former rate is used in this report.

Except for accidents which caused disability on the day of the visit or resulted in hospitalization or death, no attempt was made to obtain a record of those which disabled for less than 1 week.

A nominal number of accidents which caused disability within the 12-month period, but occurred prior to it, have been included.

[7] For a discussion of classification of disability according to sole, primary, and contributory causes see Britten, Collins, and Fitzgerald, op. cit., footnote 11, page 448, and lines 21–26, page 463.

In 87 percent of 11,608 reported periods of disability of 1 week or more in which an accident in the home was involved, the sole cause (or diagnosis) was the home accident; in 9 percent the home accident was the primary cause; and in only 4 percent, a contributory cause.

A small number of accident diagnoses (104) contributory to another accident diagnosis have been included for convenience in tabulating.

[8] Since the informant was asked at a single visit to recall accidents which had occurred in the family during the previous 12 months, this rate is somewhat below the true value, even though a minimum period of disability (7 consecutive days) was set in order to avoid too great underreporting.

longer during the 12 months immediately preceding the visit. The severe nature of accidents resulting in such a long period of disability is obvious.

Disability from home accidents.—The annual number of days of disability arising from home accidents (disabling for 1 week or more) was 0.23 per person observed, or 31 percent of the total rate for accidents (0.75 days, all places of occurrence) and 2.3 percent of the total rate for all causes (9.9 days). The average duration (within the 12-month period) of home accidents disabling for 1 week or more was 49 days per case. It is important to note that inclusion of accidents disabling for less than a week would have slightly increased the number of days per person and greatly decreased the average duration of disability.[9]

Home accidents by sex.—The annual frequency rate of recorded home accidents for females was almost one-and-one-half times that for males. As shown in table 1, the rate for females (all ages) was 5.45 per 1,000 and that for males, 3.78.

The fact that the National Health Survey rate for accidents, all places of occurrence combined, was 81 percent higher for males than females should make one cautious in attributing this excess in the home accident rate for females to a sex differential in accident proneness. Moreover, as discussed in a following section, it appears from the findings of this report that the excess in the home accident rate for females is due in part to greater exposure, both in terms of time and activity in the home.

TABLE 1.—*Annual frequency of home accidents disabling for 1 week or more,[a] by age and sex [b]*

Age (years)	Annual frequency per 1,000 persons			Number of cases[c]		
	Both sexes	Male	Female	Both sexes	Male	Female
All ages	4.65	3.78	5.45	11,608	4,540	7,068
Under 5	5.09	5.99	4.16	894	534	360
5–9	4.79	5.81	3.77	972	592	380
10–14	3.65	4.84	2.48	820	542	278
15–24	2.38	2.61	2.17	1,061	540	521
25–44	3.24	2.38	4.01	2,657	922	1,735
45–64	6.51	3.82	9.11	3,160	914	2,246
65 and over	14.35	7.79	19.65	2,044	496	1,548

The possibility of slightly more complete reporting by an informant of his or her own illnesses may account for a small portion of the excess in the rate for females, since in a greater percentage of instances females were the informants.

[9] Unpublished data from the survey made by the Committee on the Costs of Medical Care show 0.73 days of disability from all causes (illnesses and accidents) per person per year for cases disabling for less than 7 consecutive days. Based on this figure, it is estimated that for home accidents the annual number of days of disability per person observed would be about 0.25 if cases disabling less than 1 week could have been included.

Home accidents by age.—The annual frequency rate of home accidents disabling 1 week or more decreased from 5.09 per 1,000 persons under 5 years of age to 2.38 for persons 15–24 years, and then rose rapidly with advancing age to 14.35 for persons 65 years and older (table 1).[10]

Although this table appraises the change with age in the frequency of home accidents having a certain minimum period of disability (1 week), caution must be observed in applying these findings to accidents generally. It is recognized that a particular type of accident (i. e., with a given set of antecedent causes and circumstances) which is trifling in its effect on a young person may cause disability in an old person, and also that a type which causes a short period of disability in the former may disable the latter for a long period. Specifically, a type of accident which might disable a 20-year-old person for 3 days might disable a 70-year-old person for more than a week, and therefore be included in a frequency rate of accidents disabling for a week or more for persons 65 years and older, although excluded from the frequency rate for youths. Clearly then, an increase with advancing age in such a frequency rate may primarily reflect this increased severity.

Disability from home accidents by age.—The days of disability per person observed and the average length of periods of disability for home accidents causing disability of 1 week or more increased with advancing age, as is shown in table 2. The marked increase in the annual number of days of disability per person observed after 25 years of age reflects not only the increased frequency of periods of disability

TABLE 2.—*Days of disability per case and annual days of disability per person observed for home accidents disabling 1 week or more,[a] by age*

Age (years)	Annual days of disability per person observed[b]	Days of disability per case	Number of cases[1]	Age (years)	Annual days of disability per person observed[b]	Days of disability per case	Number of cases[1]
All ages	0.23	49.3	11,545	15–24	0.09	37.5	1,054
				25–44	.14	44.7	2,643
Under 5	.15	30.4	880	45–64	.36	55.1	3,147
5–9	.16	33.3	970	65 and over	1.08	75.4	2,032
10–14	.12	32.0	810				

of 1 week or more resulting from home accidents, but also the greater number of days comprising a single period of disability. The average length of periods of disability of 1 week or more resulting from home accidents for persons under 5 years was 30 days, and for persons 65 years and over, 75 days.

[10] If the complete rather than the attained duration of disability from home accidents still disabling on the day of the visit could have been included, there would have been a more rapid rise in this rate with advancing age.

Home accidents by age and sex.—From infancy to age 25, as is shown in table 1 and figure 1, more home accidents disabling 1 week or more occurred among males than females, but after age 25 the reverse was true. The rate for home accidents disabling 1 week or more decreased for both males and females from the rate for the age group under 5 years to a minimum in young adult life. The curve for females reached a minimum at an earlier age than that for males. After the low rate was reached, both rates increased with advancing age, but the curve for females rose more steeply than that for males.

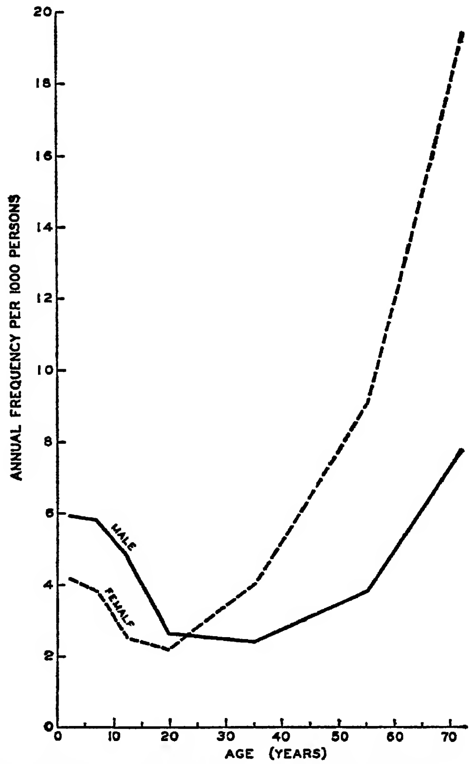

FIGURE 1.—Annual frequency (per 1,000 persons) of home accidents disabling for 1 week or more,[a] by age and sex [b]

There are many factors reflected in the age-sex differentials in the rates, among which exposure, both in terms of time spent at home and amount and type of activity, is important. For persons under 25 the sex differential was undoubtedly due in part to the more hazardous activities of boys. Time spent at home may be an important factor in the change with age in the rates for each sex: Preschool children, who are usually home most of the day, have the highest rate; elementary school children, 5–14 years of age, have a lower rate; and youths 15–24 years of age, who on the average spend even less time

at home than elementary school children, have the lowest rate. (The relation between exposure and accidents among adults is discussed in a later section on employment status.)

Home accidents and economic status.—Persons in poor economic circumstances [11] reported relatively more accidents resulting in disability for 1 week or longer than did persons in those families in the higher income brackets (table 3). The annual frequency rate of serious home accidents decreases progressively from 6.01 for every 1,000 persons observed in the relief group to 4.10 for the group with from $1,000 to $1,500 annual family income. After an annual income of $1,500 is reached there was little change in the rate.

Because of differences in age composition of persons in the several income brackets and because the rate for serious home accidents increased with age, the actual (crude) rates for persons in families in each income group do not adequately describe the true relation between serious home accidents and economic status. Hence, the rates have been adjusted to a standard age distribution.[12] The result-

TABLE 3.—*Annual frequency (per 1,000 persons) of home accidents disabling for 1 week or more,[a] by age and economic status [e]*

Annual family income and relief status	Age (years)									Number of cases, all ages
	All ages		Under 5	5-9	10-14	15-24	25-44	45-64	65 and over	
	Crude	Adjusted [1]								
All incomes	4.65	4.65	5.09	4.79	3.65	2.38	3.24	6.51	14.35	[e]11,608
Relief	6.01	6.25	6.22	5.16	4.48	3.16	5.43	8.56	17.16	2,721
Nonrelief:										
Under $1,000	5.30	5.00	4.78	4.58	3.25	2.65	3.53	7.50	15.98	3,054
$1,000 to $1,500	4.10	4.20	4.88	4.75	3.70	2.13	2.91	5.72	12.15	2,204
$1,500 to $2,000	3.87	4.00	4.56	5.01	3.09	2.02	2.47	5.70	12.61	1,523
$2,000 and over	4.01	4.03	4.55	4.67	3.39	2.06	2.54	5.58	12.98	1,758
$1,500 and over	*3.94*	*4.02*	*4.56*	*4.85*	*3.24*	*2.04*	*2.51*	*5.63*	*12.82*	*3,281*
Relief and nonrelief under $1,000	*5.61*	*5.53*	*5.56*	*4.91*	*3.92*	*2.87*	*4.28*	*7.91*	*16.36*	*5,775*

[1] Adjusted to the age composition of all persons enumerated in the National Health Survey.

ant rates permit consideration of the relation between serious home accidents and economic status with the differential effect of one influencing factor, age, removed. The actual (or crude) and the adjusted rates as well as the rates by age are shown in table 3 for

[11] In the National Health Survey families were classified by income received during the 12 months preceding the interview and also by whether relief from official agencies had been received during that time. Persons in families with annual income under $1,000 comprised about 40 percent of the surveyed group; about 65 percent were in families with annual incomes under $1,500, and 80 percent in families with incomes under $2,000. Almost one-half of the lowest income group had been in receipt of relief during the year 1935

[12] Within any income group the rate for home accidents disabling 1 week or more in each age group was multiplied by the total number of persons (all incomes) in that age group, the products were summed, and the sum was divided by the total number of persons. For standard population, see figures given in reference *e*, page 2085 (all incomes).

groups with different income status. The adjusted rate for the relief group is higher than the crude rate, and for the nonrelief group under $1,000, it is lower.

At each age the frequency of home accidents disabling for 1 week or more was greater for the relief group than for any other economic status group. This fact is evident from figure 2, which shows, by age, the ratio of the frequency rate for each economic status group to that for the highest. The greatest variation in this ratio occurred within the 25–44 age group, in which the relief rate was over twice

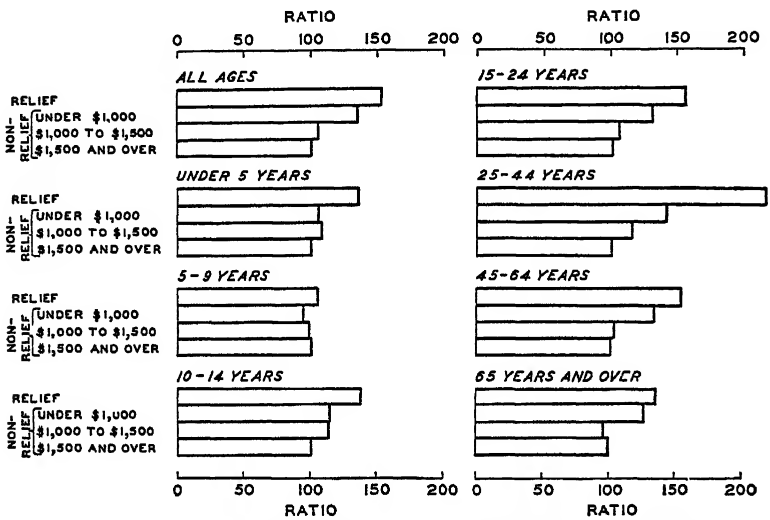

FIGURE 2.—Ratio of the annual frequency rate of home accidents disabling for 1 week or more [a] for each income group to the rate for the income group $1,500 and over, by age ($1,500 and over = 100 percent).[c]

as high as the rate for the group with highest economic status. The least variation in the ratio occurred for ages 5–9 years.

Annual frequency rates of home accidents disabling for a week or more, by sex, according to economic status, are given in table 4. The rates (both adjusted and crude) for each sex decreased with a rise in family income. As is also shown in table 4, the rates show almost no variation in the ratio of the rate for females to that for males for the several income groups.[13]

[13] Another description of the relation of home accidents to economic status is possible from the comparison of the rates for colored and white persons, since proportionately more colored persons are in low-income status than white persons. The home accident rate for colored persons was higher than that for white persons, as is shown by the following ratios for home accidents which caused disability on the day of the visit.

Geographic area	*Ratio of colored to white rate (white rate = 100)*
Northeast (cities of 100,000 or more)	153
North Central (cities of 100,000 or more)	123
South (cities of all sizes)	132

In the areas shown the colored population is largely Negro. The West is omitted because of the different racial make-up of the colored group in this area.

Home accidents and poor housing.—The foregoing comparisons by economic status suggest an association between the quality of the housing and the frequency of home accidents. This phase is receiving special attention in other reports.[14]

TABLE 4.—*Annual frequency of home accidents disabling for 1 week or more,[a] by sex and economic status,[f] and ratio of rate for females to that for males in different income groups*

Annual family income and relief status	Annual frequency per 1,000 persons				Ratio of female to male rate[1] (male rate =100)	Number of cases [e]	
	Male		Female			Male	Female
	Crude	Adjusted[1]	Crude	Adjusted[1]			
All incomes	3.78	3.76	5.45	5.42	144	4,540	7,068
Relief	5.29	5.14	6.71	7.31	142	1,173	1,548
Nonrelief:							
Under $1,000	4.13	4.02	6.32	5.77	144	1,115	1,939
$1,000 to $1,500	3.36	3.38	4.80	4.93	146	879	1,325
$1,500 and over	3.16	3.28	4.67	4.68	143	1,271	2,010

[1] Adjusted to the age composition of all persons enumerated in the National Health Survey.

Home accidents among employed workers and housewives.—The character of a person's activity as well as the time spent in the home is apparently reflected in the rates for home accidents, as is brought out by comparing the rates for employed males, employed females, and housewives (ages 15–64 years).[15] Table 5 shows that the rate for employed male workers was 2.30 per 1,000 persons, that for employed female workers 3.90, and that for housewives 5.33. The rates for employed female workers and for housewives exceeded that for employed male workers by 70 percent and 132 percent, respectively.

[14] Britten, Rollo H., Brown, J. E., and Altman, Isidore: Characteristics of urban housing and their relation to illness and accidents: Summary of findings from the National Health Survey. The Milbank Memorial Fund Quarterly, vol. 18, No. 2, April 1940.

Britten, Rollo H., and Altman, Isadore: Illness and accidents among persons living under different housing conditions. In press.

[15] Rates adjusted to age composition of all persons enumerated in the National Health Survey.

Employment status used is that existing on day of visit and not necessarily that on day of accident which fact may introduce an element of selection in comparisons by employment status. The term "employed workers," as used in this report, applies to persons engaged for wages in money or in kind, including those on vacation, on strike, or temporarily ill who were expecting to return to work and part-time workers (except those who were attending school regularly). The term "housewives" applies to women, not gainfully employed, whose main duty is care of the home.

As indicated in footnote 5, accidents of servants while at work on residential property are included as home accidents. Since such servants comprise only about 10 percent of female workers and about 0.2 percent of male workers (U. S. Bureau of the Census, 1930) comparison between rates for these two groups of workers (and for housewives) is not materially affected by this inclusion.

TABLE 5.—*Annual frequency of home accidents disabling for 1 week or more[a] among persons 15–64 years of age, by employment status and sex,[g] and ratio of rate in each group to that for employed male workers*

Sex and employment status	Annual frequency per 1,000 persons		Ratio of rate [1] to that for employed workers (male rate=100)	Number of cases
	Crude rate	Adjusted rate [1]		
Employed male workers	2.37	2.30	100	1,298
Employed female workers	3.27	3.90	170	684
Housewives	5.92	5.33	232	2,983

[1] Adjusted to the age composition of all persons 15–64 years of age enumerated in the National Health Survey.

The influence of the character of activity and time spent in the home on the rates of serious home accidents is evident also from table 6, in which rates for employed female workers and for housewives are given by age. As was to be expected, the rates for housewives were higher than the rates for employed female workers for every age group over the range from 15 to 65 years. It is to be noted, however, that, while for the youngest age group, 15–24 years, the rate for housewives (2.97 per 1,000 persons) was over twice as high as that for employed female workers (1.46 per 1,000), the excess in the rates for housewives decreased progressively after age 25. It is possible that this trend reflects not only a minimum of activity in the home on the part of young employed female workers (15–24 years) and increased activity on the part of the older employed female workers, but also performance of fewer home duties by housewives after age 45.

TABLE 6.—*Annual frequency of home accidents disabling for 1 week or more[a] among employed female workers, and among housewives (ages 15–64 years), and ratio of rate for housewives to that for employed female workers, by age[h]*

Age (years)	Annual frequency per 1,000 persons		Ratio of rate for housewives to that for employed female workers (rate for employed female workers=100)	Number of cases	
	Employed female workers	Housewives		Employed female workers	Housewives
All ages, 15–64:					
Crude rate	3.27	5.92	181	684	2,983
Adjusted rate [1]	3.90	5.33	137		
15–24	1.46	2.97	203	94	146
25–44	2.76	4.33	157	300	1,195
45–64	8.08	9.19	114	290	1,642

[1] Adjusted to the age composition of all persons 15–64 years of age enumerated in the National Health Survey.

Another indication of the influence of the factor of exposure on the rates for serious home accidents is evident from the comparison of such rates for employed female workers and for housewives by economic status. As shown in table 7, in all income groups housewives had proportionately more accidents in the home than did employed female workers. Furthermore, the percentage by which the rates for housewives exceeded the rates for employed female workers was greater in the higher income groups (over $1,000) than it was in the lower income groups (relief and nonrelief under $1,000). The comparatively high rates among employed female workers in the lower income groups may be due to the fact that these employed women perform home duties to a greater degree than do employed women in the higher income groups.

TABLE 7.—*Annual frequency of home accidents disabling for 1 week or more [a] among employed female workers and among housewives (ages 15–64 years)[1] and ratio of the rate for housewives to that for employed female workers, by economic status*

Annual family income and relief status	Annual frequency per 1,000 persons				Ratio of the rate [1] for housewives to that for employed female workers (rate for employed female workers =100)	Number of cases	
	Crude rate		Adjusted rate [1]				
	Employed female workers	Housewives	Employed female workers	Housewives		Employed female workers	Housewives
All incomes	3.27	5.92	3.90	5.33	137	684	2,983
Relief	4.30	7.73	5.65	7.04	125	66	651
Nonrelief:							
Under $1,000	4.54	6.04	4.92	5.49	112	261	720
$1,000 to $1,500	2 66	5.50	3.12	5.05	162	121	659
$1,500 and over	2.60	5.27	3.26	4.63	142	236	953
Relief and nonrelief under $1,000	*4.49*	*6.74*	*5.01*	*6.14*	*123*	*327*	*1,371*

[1] Adjusted to the age composition of all persons 15–64 years of age enumerated in the National Health Survey.

Home accidents among housewives by economic status and age.—While, as has been indicated in the preceding paragraph, the annual frequency rates of serious home accidents among housewives (15–64 years of age) were relatively higher in the lower economic status groups, there were considerable differences by age in the relationship between such rates and economic status (see table 8). The least variation by economic status was shown for the younger housewives, aged 15–24 years. In the age group 25–44 years, the rate was almost twice as high for housewives in families on relief as it was for housewives in families with incomes of $1,500 and over.

TABLE 8.—*Annual frequency of home accidents disabling for 1 week or more [a] among housewives (ages 15–64 years), and ratio of the rate for each income group to that for the highest income group, by age and economic status* [a]

Annual family income and relief status	Annual frequency per 1,000 housewives					Ratio of the rate for each income group to that for the highest income group (rate of highest income group =100)				Number of cases, all ages: 15–64
	All ages: 15–64 years		15–24 years	25–44 years	45–64 years	All ages: 15–64 years [1]	15–24 years	25–44 years	45–64 years	
	Crude rate	Adjusted rate [1]								
All incomes	5.92	5.33	2.97	4.33	9.19					2,983
Relief	7.74	7.04	2.74	6.54	11.85	152	95	191	143	651
Nonrelief:										
Under $1,000	6.04	5.49	3.44	4.25	9.46	119	119	124	114	720
$1,000 to $1,500	5.40	5.05	2.60	4.23	8.70	109	90	124	105	659
$1,500 and over	5.27	4.63	2.89	3.42	8.28	100	100	100	100	953
Relief and nonrelief under $1,000	*6.74*	*6.14*	*3.16*	*5.26*	*10.37*	*133*	*109*	*154*	*125*	*1,371*

[1] Rates adjusted to the age composition of all persons 15–64 years of age enumerated in the National Health Survey.

Home accidents by means of injury.—The enumerator recorded on the schedule not only the place of occurrence of accidents but also the means of injury. The latter have been grouped into the following four broad categories: Falls, cutting and piercing instruments, burns, and all other means.[16] The annual frequency per 1,000 persons of home accidents disabling for a week or more, according to such categories, was:

Falls [17]	2.99
Cutting and piercing instruments	.61
Burns	.38
All other means [18]	.67

Falls made up 64 percent of home accidents (disabling 1 week or more), cutting and piercing instruments 13 percent, burns 8 percent, and other means of injury 14 percent.

The annual frequency rates per 1,000 persons according to means of injury, classified by age and sex, are shown in table 9. For each age group the rate for falls was much higher than the rate for any other means of injury and largely determines the age curve for all means of injury combined (see fig. 3).

[16] *Falls* relates to falls of persons and includes fractures and sprains unspecified as to means of injury. *Cutting and piercing instruments* includes infected wounds unspecified as to means of injury. *Burns* comprises burns of any type (except those from electric currents). The *all other* group is made up largely of accidents caused by machinery, animals, firearms, etc., and of poisonings (gas, food, plants, etc.). Homicides and suicides (including attempts) are excluded.

[17] The annual frequency rates for the accidental traumatisms included in *falls* were as follows: Fall with fracture, 1.31 per 1,000 persons; fall with infected wound, 0.04; other falls, 1.25; sprain (unspecified as to means of injury), 0.15; fracture (unspecified as to means of injury), 0.24.

[18] In the *all other* group, machinery, and firearms and fireworks gave the largest annual frequency rates, being, respectively, 0.10 and 0.03 per 1,000 persons.

TABLE 9.—*Annual frequency (per 1,000 persons) of home accidents disabling for a week or more,[a] by means of injury, and sex and age of persons observed [b]*

Sex and means of injury	Age (years)								Number of cases, all ages [c]
	All ages	Under 5	5-9	10-14	15-24	25-44	45-64	65 and over	
Both sexes—all means	4.65	4.09	4.79	3.65	2.38	3.24	6.51	14.35	11,608
Falls	2.99	2.44	2.80	2.17	1.14	1.89	4.62	11.86	7,475
Cutting and piercing instruments	.61	.46	.75	.72	.61	.53	.64	.74	1,519
Burns	.38	1.26	.59	.27	.23	.25	.31	.54	938
All other means [1]	.67	.93	.66	.49	.40	.56	.93	1.21	1,676
Male—all means	3.78	5.99	5.81	4.84	2.61	2.38	3.82	7.79	4,540
Falls	2.12	2.87	3.53	2.85	1.12	1.17	2.32	5.80	2,544
Cutting and piercing instruments	.66	.62	.89	1.03	.76	.51	.54	.76	795
Burns	.32	1.37	.56	.27	.20	.18	.18	.38	385
All other means	.68	1.14	.83	.70	.53	.52	.78	.86	816
Female—all means	5.45	4.16	3.77	2.48	2.17	4.01	9.11	19.65	7,068
Falls	3.80	1.99	2.05	1.49	1.15	2.54	6.86	16.76	4,931
Cutting and piercing instruments	.56	.30	.60	.42	.48	.55	.73	.72	724
Burns	.43	1.17	.62	.28	.25	.32	.44	.67	553
All other means	.66	.71	.50	.30	.29	.60	1.08	1.50	860

[1] The largest groups were machinery, with a rate of 0.10 per 1,000 (all ages), and firearms and fireworks, 0.03.

Although the curves for the other three means-of-injury groups appear to be quite similar in figure 3, there was considerable variation among them in the trend with age. The rate for burns, in sharp contrast with that for falls, was much higher for children, especially those under 5 years of age, than it was for adults, and after reaching

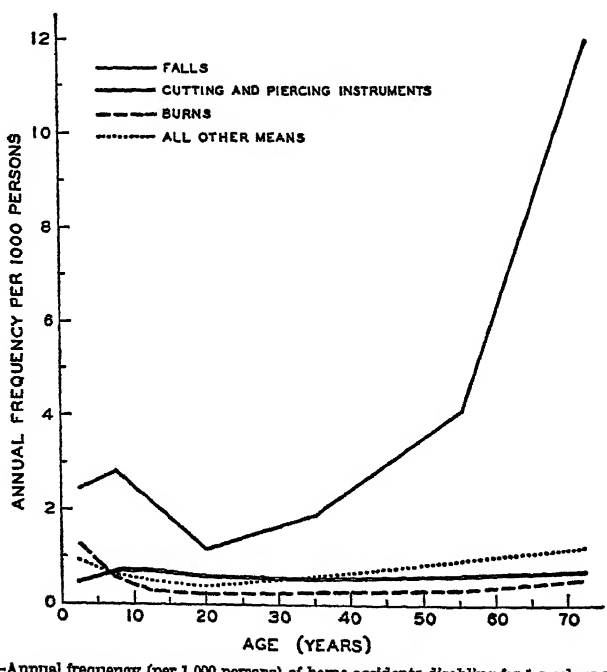

FIGURE 3.—Annual frequency (per 1,000 persons) of home accidents disabling for 1 week or more,[a] by age and means of injury.[b]

a minimum at about age 25 increased with advancing age, but not nearly so rapidly as did the rate for falls. The variation by age was much less in the rates for cutting and piercing instruments than in the rates for the other groups of means of injury.

In figure 4 the rates are differentiated by sex as well as by age. Since, as has been indicated, the rate for falls largely fixes the pattern

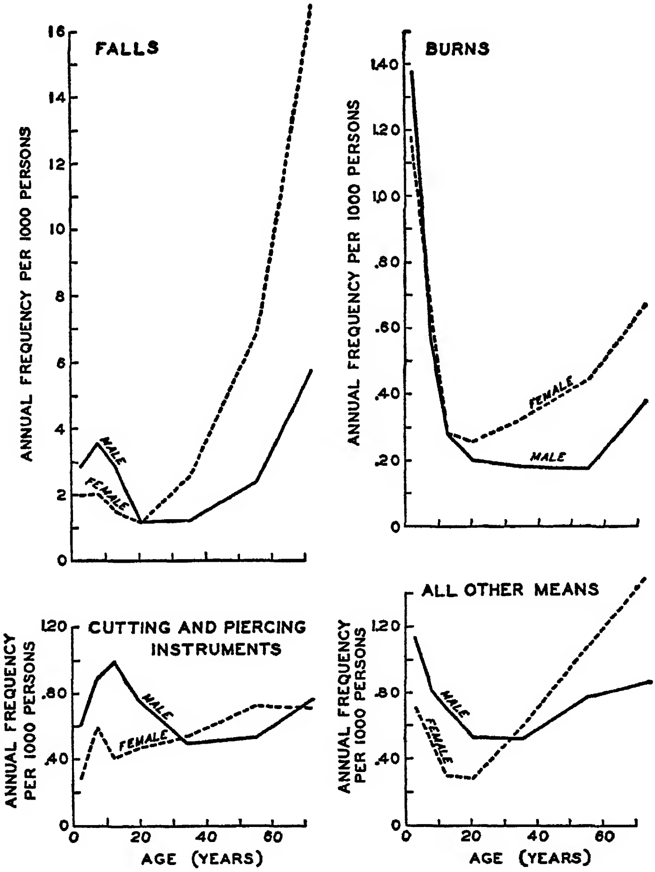

FIGURE 4.—Annual frequency (per 1,000 persons) of home accidents disabling for 1 week or more [a] for different means of injury, according to sex and age. (Scales are so made that the rate for all ages of both sexes represents an interval on the vertical rate scale that corresponds to about 30 years on the horizontal age scale.)

of the rates for all means of injury combined, the discussion in regard to figure 1 is applicable here so far as the curve for falls is concerned. For burns the rates for males and females were practically identical among children. For adults, however, the rates for females were very much greater than those for males. In the younger age groups the rates for males for cutting and piercing instruments were very much higher than the rates for females.

In a previous section there has been some discussion of the effect of exposure on the differences in the rates by age and sex for certain employment status groups. The variation by various means of injury shown in figure 4 by age and sex similarly reflects differences in amount of exposure.

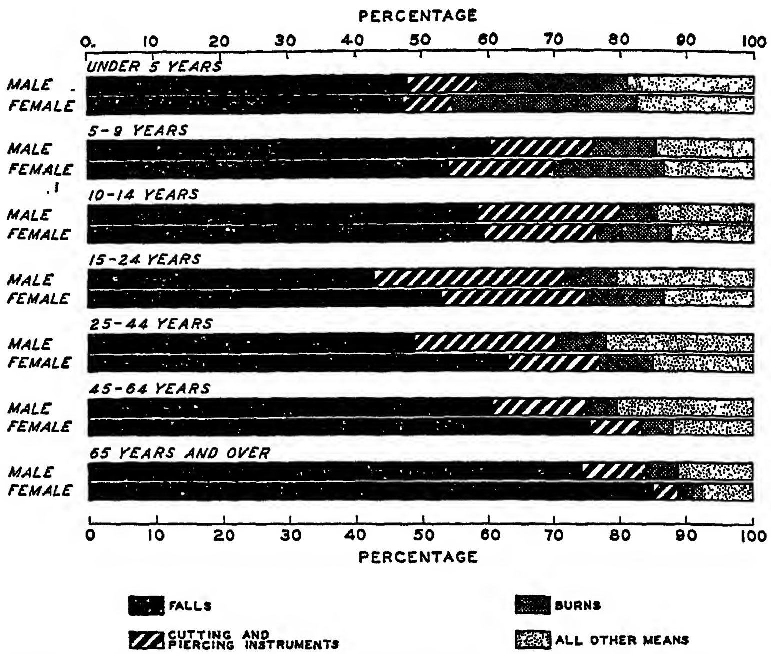

FIGURE 5.—Percentage distribution of home accidents disabling for 1 week or more [a] by means of injury in different age and sex groups.[b]

Figure 5 gives the percentage distribution of home accidents disabling for 1 week or more by means of injury and by age and sex. For each sex at every age the greatest proportion of these accidents was due to falls. From infancy to age 10 falls made up a slightly higher proportion of home accidents disabling for 1 week or more for boys than for girls. For the age group 10–14 years there was no appreciable difference in the two rates. After age 15 the proportion of home accidents due to falls among females was not only in excess of that among males, but the amount of the excess was greater than the male excess among children.

Fractures resulting from home accidents.—One indication of the severity of home accidents is the relatively high annual frequency of those (disabling for 1 week or more) which involved fractures, 1.55 per 1,000 persons (table 10). Fractures occurred in one-third of all such home accidents and in one-half of those ascribed to falls (see footnote 17).

TABLE 10.—*Annual frequency (per 1,000 persons) of home accidents disabling for a week or more [a] which resulted in fractures, by sex and age of persons observed [b]*

Sex	Age (years)								Number of cases [b]
	All ages	Under 5	5-9	10-14	15-24	25-44	45-64	65 and over	
Both sexes	1.55	1.26	1.89	1.37	0.51	0.79	2.37	6.61	3,879
Male	1.17	1.39	2.40	1.92	.63	.54	1.18	3.19	1,410
Female	1.90	1.12	1.38	.82	.41	1.00	3.53	9.37	2,469

As in the case of falls, the annual frequency rate of serious accidents involving fractures was considerably higher for females (1.90 per 1,000 persons) than for males (1.17), but there was little difference between the sexes in the proportion of falls which resulted in fractures.

The distribution by age of home accidents (disabling for 1 week or more) associated with fractures is shown in table 10. The annual frequency rate for children under 5 years was 1.26 per 1,000; it increased to 1.89 in the succeeding age group (5–9); fell to a minimum of 0.51 among youths (15–24); then rose steeply to a maximum of 6.61 among persons 65 years and over. This age curve follows, at a lower level, that for falls (see fig. 3), with the exception that the rate for fractures was relatively higher among children under 15 and relatively lower in the age groups 15–24 and 25–44. Of home accidents (disabling for 1 week or more) due to falls, the percentage resulting in fractures was, according to age, as follows:

All ages	*Under 5 years*	*5-9 years*	*10-14 years*	*15-24 years*	*25-44 years*	*45-64 years*	*65 years and over*
52	52	67	63	45	42	51	56

HOME ACCIDENTS AS A CAUSE OF IMPAIRMENT

Orthopedic impairments resulting from home accidents.—Still another aspect of the seriousness of the problem of home accidents is the fact that a large number of persons surveyed had permanent orthopedic impairments [19] which were reported as caused by home accidents. As table 11 shows, the prevalence of these impairments, composed of both loss of members and crippled or paralyzed members, was 2.88 per 1,000 persons,[20] a figure which represents (for these impairments) the permanent effects of injury from home accidents over the attained lifetime of living individuals in the surveyed population. Impair-

[19] Impairments enumerated were of such a serious nature that the family informant considered them to be permanently crippling, deforming, or paralyzing (including loss of members). They may or may not have caused disability, i. e., inability to pursue usual activities of work, school, household duties, etc.

[20] Since, in general, only one orthopedic impairment was coded for each individual, all references to total prevalent cases can also be considered as representing the total number of individuals affected. "One orthopedic impairment" may be inclusive of more than one member or part of the body, but when it was not possible to include under "one orthopedic impairment" all parts of the body affected for one person, the most serious impairment was coded.

ments due to home accidents constituted about 15 percent of those due to all causes, accident and disease, and 24 percent of those due to accidents wherever the place of occurrence.[21]

TABLE 11.—*Prevalence (per 1,000 persons) of orthopedic impairments due to home accidents,*[1] *according to sex and age of persons observed,*[b] *and ratio of male rate to female rate by age of persons observed*

Sex	Age (years)								Number of cases,[1] all ages
	All ages	Under 5	5-9	10-14	15-24	25-44	45-64	65 and over	
Both sexes	2.88	0.27	0.73	1.12	1.85	2.67	4.56	10.65	7,194
Male	3.30	.22	.84	1.53	2.75	3.57	4.90	8.74	3 949
Female	2.51	.32	.62	.72	1.08	1.88	4.23	12.24	3,245
Ratio of male to female rate	131	69	135	212	255	190	116	71	

[1] Permanent effects of home accidents accumulated over the attained lifetime of living individuals in the population.

As is also shown in table 11, the prevalence of orthopedic impairments due to home accidents was greater among males (3.30 per 1,000 persons) than among females (2.51). This excess in the male orthopedic rate over the female (30 percent) contrasts sharply with the excess in the female over the male rate (50 percent) in the case of the annual frequency rate of home accidents (see table 1). From table 11 it is also seen that this excess in the male over the female rate of orthopedic impairments was greatest in the age group 15–24 and was still very great in the age groups 10–14 and 25–44. In the two extreme age groups, under 5 years and 65 years and over, the rate among females was higher than that among males.

From table 12 it may be seen that loss of members accounted for about 42 percent of orthopedic impairments resulting from home accidents and that these losses were predominantly (90 percent) fingers and toes. Crippled or paralyzed members, constituting the remaining 58 percent of the impairments, were, on the other hand, chiefly "major" (i. e., other than fingers and toes). Of these crippled or paralyzed members, feet or legs made up 52 percent, hands or arms 19 percent, spine, back, side, other trunk, head, or entire body, 15 percent, and fingers or toes 14 percent.

[21] See Britten, Collins, and Fitzgerald, op. cit., page 460

TABLE 12.—*Prevalence (per 1,000 persons) of specified orthopedic impairments due to home accidents,[1] according to age of persons observed* [b]

Nature of impairment	Age (years)								Number of cases,[1] all ages
	All ages	Under 5	5-9	10-14	15-24	25-44	45-64	65 and over	
All orthopedic impairments	2.88	0.27	0.73	1.12	1.85	2.67	4.56	10.65	7,194
Finger(s) and/or toe(s)	1.33	.14	.38	.61	1.03	1.47	2.03	2.94	3,312
Hand(s) and/or arm(s)	.36	.040	.11	.18	.26	.30	.60	1.26	903
Foot (feet) and/or leg(s)	.94	.057	.16	.24	.39	.64	1.59	5.58	2,360
Spine, back, chest, side, other trunk, head, or entire body	.25	.034	.079	.085	.18	.25	.34	.88	619
Loss of members	1.22	.11	.33	.52	.95	1.35	1.95	2.61	3,056
Finger(s) and/or toe(s)	1.10	.10	.33	.50	.88	1.23	1.70	2.27	2,748
Hand(s) and/or arm(s)	.052	(²)	--------	(²)	.034	054	.095	.15	130
Foot (feet) and/or leg(s)	.071	--------	--------	--------	.031	.072	.16	.20	178
Crippled or paralyzed members	1.66	.16	.40	.60	.90	1.32	2.60	8.04	4,138
Finger(s) and/or toe(s)	.23	.034	.054	.11	.14	.25	.33	.67	564
Hand(s) and/or arm(s)	.31	.034	.11	.17	.22	.25	.50	1.11	773
Foot (feet) and/or leg(s)	.87	.057	.16	.24	.36	.57	1.43	5.38	2,182
Spine, back, chest, side, other trunk, head, or entire body	.25	.034	.079	.085	.18	.25	.34	.88	619

[1] Permanent effects of home accidents accumulated over the attained lifetime of living individuals in the population.
[2] Less than 5 cases.

Largely because of the accumulation (over the attained lifetime of the population) of the permanent effects of home accidents, the prevalence rate increased rapidly with advancing age (see table 12 and fig. 6). Among children under 5 years of age the rate was 0.27 per 1,000; it was almost 10 times that figure (2.67) in the age group 25–44 and increased to almost 40 times that amount (10.65) among older persons (65 and over). A comparison of the rate for crippled or paralyzed members (chiefly major) with that for loss of members (chiefly minor) reveals that crippled or paralyzed members were somewhat more prevalent in the younger ages (under 15) than were losses; the two rates were about the same from ages 15 to 45; after 45 years the prevalence of crippled or paralyzed members increased much more rapidly than that of loss of members.

The prevalence of specific orthopedic impairments due to home accidents is given in table 13 according to the means of injury. Falls were the most important means and were responsible for 39 percent of the home injuries which resulted in orthopedic impairments.

From a comparison of data in tables 9 and 13, it is evident that cutting and piercing instruments, machinery, and firearms, and fireworks were the means of injury in a greater proportion of home accidents resulting in orthopedic impairments (over the attained lifetime of the population) than in the total of home accidents disabling

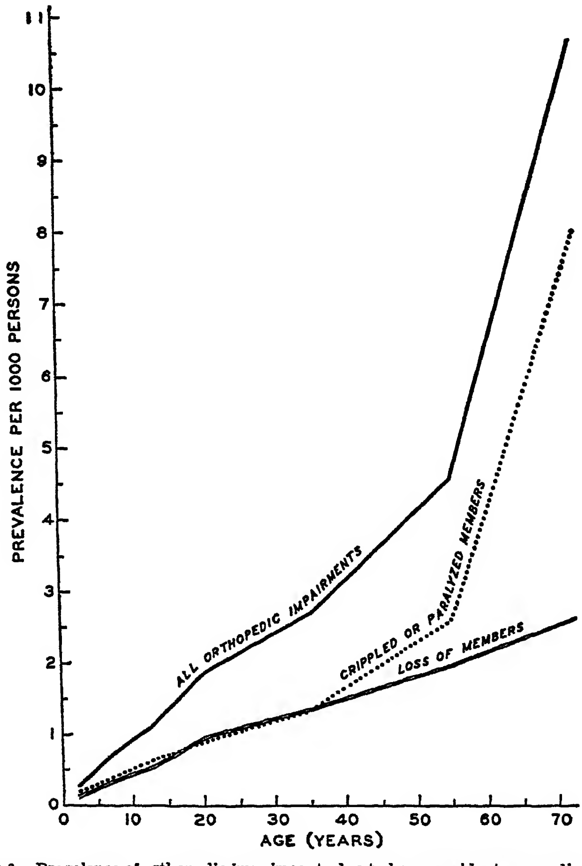

FIGURE 6.—Prevalence of orthopedic impairments due to home accidents, according to age.[b]

for 1 week or more (with or without resultant orthopedic impairments) occurring during the 12-month period immediately preceding the visit. The percentage distribution according to means of injury is as follows:

	All means	*Falls*	*Cutting and piercing instruments*	*Burns*	*Machinery*	*Firearms and fireworks*	*All other*
Orthopedic impairments due to home accidents accumulated over the attained lifetime of the surveyed population	100	39	23	5	11	6	17
Home accidents disabling for 1 week or more during 12-month period immediately preceding the visit	100	64	13	8	2	1	12

It is possible that the distribution of recently acquired impairments according to the means of injury would be somewhat different, owing to changes in exposure to the various means of injury.

As shown in table 13 and figure 7, there was an association between the nature of the impairment and the means of injury. Specifically, cutting and piercing instruments and machinery played the most important part in the loss or crippling of fingers and toes; firearms and fireworks, in the loss of hands or arms; falls and cutting and piercing instruments, in the loss of feet or legs; and falls, in the crippling or paralyzing of major members (hands or arms, feet or legs, spine, etc.).

TABLE 13.—*Prevalence (per 1,000 persons) of orthopedic impairments due to home accidents,[1] according to nature of impairment and means of injury* [b]

Nature of impairment	Means of injury							Number of cases,[1] all means
	All means	Falls	Cutting and piercing instruments	Burns	Machinery	Firearms and fireworks	All other means	
All orthopedic impairments	2.88	1.12	0.65	0.13	0.31	0.17	0.50	7,194
Finger(s) and/or toe(s)	1.33	.054	.56	.059	.28	.11	.25	3,312
Hand(s) and/or arm(s)	.36	.19	.036	.038	.019	.032	.051	903
Foot(feet) and/or leg(s)	.94	.69	.052	.024	.006	.023	.15	2,360
Spine, back, chest, side, other trunk, head, or entire body	.25	.19	(2)	.009	(2)	.004	.044	619
Loss of members	1.22	.059	.49	.038	.27	.14	.23	3,056
Finger(s) and/or toe(s)	1.10	.027	.47	.031	.26	.10	.21	2,748
Hand(s) and/or arm(s)	.052	.009	.008	.004	.007	.019	.006	130
Foot(feet) and/or leg(s)	.071	.023	.020	.003	.004	.010	.011	178
Crippled or paralyzed members	1.66	1.06	.16	.092	.038	.036	.27	4,138
Finger(s) and/or toe(s)	.23	.027	.098	.028	.023	.005	.043	564
Hand(s) and/or arm(s)	.31	.18	.028	.034	.012	.013	.045	773
Foot(feet) and/or leg(s)	.87	.66	.033	.020	.002	.014	.14	2,182
Spine, back, chest, side, other trunk, head, or entire body	25	.19	(2)	.009	(2)	.004	.044	619

[1] Permanent effects of home accidents accumulated over the attained lifetime of living individuals in the population.
[2] Less than 5 cases.

Blindness resulting from home accidents.—Further evidence that home accidents are a serious problem is contained in the data on the causes of blindness as recorded in the survey. Table 14 presents the prevalence rates of blindness in one or both eyes [22] resulting from home accidents.[23] It is to be noted from this table that: (*a*) The prevalence

[22] The enumerator was not asked to inquire in regard to partial blindness but to enter it when the information was volunteered.
[23] For prevalence rates of blindness due to all causes see Britten, Collins, and Fitzgerald, op. cit., table 14, page 463.
A more detailed report on the blind as enumerated in the National Health Survey is in preparation.

rate of blindness in one or both eyes due to home accidents was 57.9 per 100,000; (*b*) the male prevalence rate of blindness (one or both

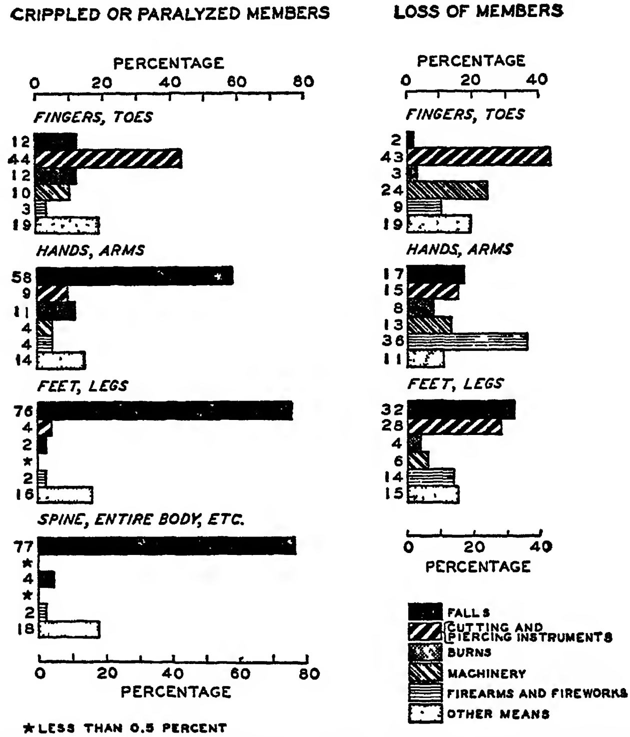

FIGURE 7.—Percentage distribution of specified orthopedic impairments due to home accidents, according to the means of injury.[b]

eyes) due to home accidents (83.1 per 100,000) was more than twice the female rate (34.5); (*c*) the rate of blindness in one eye was much greater (54.6) than the rate of blindness in both eyes (3.3).

TABLE 14.—*Prevalence (per 100,000 persons) of blindness due to home accidents,[1] according to sex of persons observed* [b]

Blindness	Both sexes	Male	Female	Number of cases, both sexes
One or both eyes	57.9	83.1	34.5	1,447
One eye	54.6	78.9	32.1	1,365
Both eyes	3.3	4.2	2.4	82

[1] Permanent effects of home accidents accumulated over the attained lifetime of living individuals in the population.

Home accidents caused 14 percent of all blindness (one or both eyes) enumerated in the survey and 34 percent of such blindness due to accidents (wherever the place of occurrence). In comparison with

all other accidents and in comparison with all other causes (disease, congenital, etc., but excluding accidents), home accidents were relatively more often a cause of blindness in one eye than in both eyes, as is shown in the following table:

Cause of blindness	Percentage distribution of persons blind in one or both eyes		
	One or both eyes	One eye only	Both eyes
Home accidents	100	94	6
All other accidents	100	91	9
All other causes (excluding accidents)	100	71	29

SUMMARY

This report, the first of a series on accidents, summarizes data collected in the National Health Survey on serious home accidents among some 2,500,000 white and colored persons in over 700,000 families in 83 cities of the United States.[24] Because of the recognized impossibility of complete enumeration at a single visit of accidents occurring during the previous 12 months, certain of the rates given are believed to be somewhat below their true values.

Frequency of disability.—Among persons enumerated in the National Health Survey the annual frequency rate of accidents in the urban home which disabled for 1 week or more was 4.65 per 1,000 persons and contributed 29 percent of the total frequency rate for accidents (16.0 per 1,000 persons, all places of occurrence). The annual frequency rate of accidents in the home which disabled persons for a month or more within the 12-month period was 2.52 per 1,000 persons.

The annual number of days of disability from home accidents (disabling for 1 week or more) per person observed was 0.23, which is 31 percent of the total rate for accidents (0.75 days, all places of occurrence), and 2.3 percent of the total rate for all causes (10 days). The average duration of the disability within the 12-month period from home accidents disabling 1 week or more was 49 days.

Sex and age.—The annual frequency rate of home accidents (disabling for 1 week or more) for females was 1.4 times that for males, being 5.45 per 1,000 persons for the former and 3.78 for the latter. The rate (both sexes) decreased from 5.09 per 1,000 persons under 5 years of age to 2.38 for persons 15–24 years, and then rose rapidly with advancing age to 14.35 for persons 65 years and older. Also, the annual number of days of disability per person observed and the average length of periods of disability (within the 12 months) increased with advancing age.

[24] For data on accidents, all places of occurrence, based on 8 cities selected from the 83 covered in the National Health Survey, see Accidents as a cause of disability, preliminary reports, Sickness and Medical Care Series, Bull. 3, prepared by Arch B. Clark of the National Health Survey.

From infancy to age 25, more home accidents disabling for 1 week or more occurred among males than among females, but after age 25 the reverse was true. The rates were especially high among older females, reaching 9.11 per 1,000 in the age group 45 to 65 and 19.65 in the age group 65 years and older.

Economic status.—Persons in poor economic circumstances reported relatively more home accidents (disabling for 1 week or more) than did persons in the higher income brackets. The annual frequency rate was highest for persons in the relief group and declined with an increase in annual family income up to $1,500. There was little difference in the rates for income groups above $1,500. While the rates were highest among persons on relief at every age, the greatest excess occurred in the young adult period, 25–44 years of age, for which the relief rate was more than twice that for the highest income group.

Amount of exposure.—There are many factors reflected in the age-sex differentials in the rates, among which exposure, both in terms of time spent at home and amount and type of activity, is important. For persons under 25 the sex differential is undoubtedly due in part to the more hazardous activities of boys, while the change with age in the rates for each sex may reflect the varying amount of time spent at home during each age period.

A comparison of the rates for employed males, employed females, and housewives (ages 15–64) also brings out the influence of the amount of exposure on the rates for home accidents. The rates for female employed workers and for housewives exceeded those for male employed workers by 70 and 132 percent, respectively. Furthermore, although the rate for housewives was higher than the rate for employed female workers for every age group, the excess in the rate for housewives decreased progressively after age 25, undoubtedly reflecting not only a minimum of activity in the home on the part of young employed female workers but also the performance of fewer home duties by housewives after age 45. Another indication of the influence of the factor of exposure on the rates for serious home accidents is the comparatively high rate among employed female workers in the lower income groups, reflecting the performance of homemaking duties to a greater degree by these workers than by those in the higher income groups.

Means of injury.—Falls were the means of injury in 64 percent of home accidents (disabling 1 week or more), cutting and piercing instruments in 13 percent, burns in 8 percent, and other means of injury in 14 percent. For each age group the rate for falls was much higher than the rate for any other means of injury and largely determined the curve for all means of injury. The rate for burns was much higher for children than it was for adults, and after reaching a

minimum at about age 25 increased somewhat with advancing age. The variation by age was much less in the rates for cutting and piercing instruments than in the rates for the other means of injury.

The frequency rate of falls disabling for 1 week or more was slightly higher for males than for females under 15 years of age, and much higher for older females. In the case of burns the rates for males and for females were practically identical among children, but among adults the rates were very much greater for females than for males. For cutting and piercing instruments the male rates were very much higher than the female rates in the younger age groups; the rates in the older age groups did not differ particularly according to sex.

Fractures.—The annual frequency of home accidents (disabling for 1 week or more) which involved fractures was 1.55 per 1,000 persons. Fractures occurred in one-third of all such home accidents and in one-half of those ascribed to falls.

Orthopedic impairments and blindness.—The prevalence rate of orthopedic impairments (both loss of members and crippled or paralyzed members) due to home accidents was 2.88 per 1,000 persons, a figure which represents (for these impairments) the permanent effects of injury from home accidents over the attained lifetime of living individuals in the surveyed population. Unlike the annual frequency of home accidents (disabling for 1 week or more), the prevalence of orthopedic impairments due to home accidents was 30 percent higher among males than among females.

Loss of members accounted for 42 percent of orthopedic impairments due to home accidents; these losses were predominantly fingers and toes. Crippled or paralyzed members constituted the remaining 58 percent and were chiefly major, e. g., hands, feet, spine.

The prevalence rate of blindness (one or both eyes) due to home accidents was 57.9 per 100,000 persons; the rate for blindness in one eye was 54.6 and in both eyes, 3.3. The male rate for blindness (one or both eyes) due to home accidents was 83.1 and the female rate, 34.5.

DISCUSSION

More than 23,000 deaths occur annually[25] as a result of accidents in the home, or nearly 2 percent of all deaths in the United States and 23 percent of accidental deaths (all places of occurrence). Although outranked by certain major causes of death, home accidents are the cause of more deaths than diphtheria, scarlet fever, whooping cough, and measles combined; of more than appendicitis; of nearly as many

[25] Based on an average of the number of deaths occurring in the years 1935–38 as reported by the U. S. Bureau of the Census

These deaths were distributed by means of injury as follows: Falls, 57 percent burns, 19 percent, firearms, 4 percent; cutting and piercing instruments, 1 percent, and other means of injury, 18 percent.

deaths as diabetes; of over two-thirds as many deaths as automobile accidents; and of over a third as many deaths as tuberculosis.[26]

A further indication of the seriousness of home accidents is the frequency and amount of disability resulting from such accidents noted in the National Health Survey. Of special significance are the facts that a large proportion of these home accidents occurred among children and among adults in the most productive ages and that many of the persons surveyed had permanent orthopedic impairments or were blind as a result of home accidents.

The importance of the role of the housewife must be recognized in any attempt to reduce the number of home accidents. Not only do housewives themselves sustain one-third of all serious home accidents but an additional one-fourth occur among children (under age 15) for whom housewives have major responsibility.

Another point of attack is suggested by the relationship between low income and a high home accident rate. Although it was impossible to determine the proportionate effect of the many factors associated with low income, nevertheless it appears that certain specific housing conditions, such as dilapidation and faulty design, overcrowding, and poor household equipment, play a part.

The findings of this report indicate the public health importance of home accidents and suggest the need for more intensive studies of the specific causes, particularly from the point of view of developing methods of prevention. Although the complexities of the problem are recognized, its gravity makes consideration of it by health authorities a clear necessity of the future.

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[26] Average annual numbers of deaths (based on number of deaths occurring in the years 1935–38 as reported by the U. S. Bureau of the Census) according to specified cause are as follows:

Cause of death	*Average for years 1935–38*	*Cause of death*	*Average for years 1935–38*
Home accidents	23,738	Appendicitis	15,566
Diphtheria	3,040	Diabetes	30,099
Scarlet fever	2,080	Automobile accidents	34,428
Whooping cough	4,295	Tuberculosis	68,667
Measles	2,493		

REFERENCES TO TABLES AND CHARTS

(These references are to be considered as supplementary to the basic description of the National Health Survey technique and definitions which have been given in "Scope and method of a Nation-wide canvass of sickness in relation to its social and economic setting," by George St. J. Perrott, Clark Tibbitts, and Rollo H. Britten. Pub. Health Rep., 54: 1663 (1939).)

[a] Includes a small number of cases with disability of less than 7 days, but which had hospital care or resulted in death.

[b] Based on 2,498,180 persons of known age in 83 cities, distributed by age and sex as follows:

	All ages	Under 5 years	5-9 years	10-14 years	15-24 years	25-44 years	45-64 years	65 years and over
Both sexes	2, 498, 180	175, 653	202, 770	224, 391	446, 369	820, 826	485, 762	142, 409
Male	1, 200, 728	89, 214	101, 917	112, 076	206, 696	388, 002	239, 187	63, 636
Female	1, 297, 452	86, 439	100, 853	112, 315	239, 673	432, 824	246, 575	78, 773

[c] Excludes 14 home accidents (of a total of 11,622) unknown as to age of persons observed.

[d] Excludes 77 home accidents (of a total of 11,622) unknown as to age of persons observed and/or duration of disability.

[e] Rate for all incomes (including unknown) based on 2,498,180 persons of known age in 83 cities, distributed by age and income as follows:

	Under 5 years	5-9 years	10-14 years	15-24 years	25-44 years	45-64 years	65 years and over
All incomes (including unknown)	175, 653	202, 770	224, 391	446, 369	820, 826	485, 762	142, 409
Relief	46, 431	53, 059	57, 126	83, 038	119, 426	71, 497	22, 087
Nonrelief:							
Under $1,000	39, 943	42, 974	47, 383	102, 079	183, 679	114, 840	45, 815
$1,000 to $1,500	39, 739	44, 423	47, 021	93, 378	189, 221	97, 902	26, 002
$1,500 to $2,000	24, 558	29, 538	33, 332	68, 418	142, 100	77, 954	18, 001
$2,000 and over	21, 086	27, 814	33, 291	77, 147	155, 518	100, 659	23, 347

Rates for persons of unknown income, based on 362 cases among 98,369 persons, are not shown.

[f] Rate for all incomes (including unknown) based on 2,498,180 persons of known age in 83 cities, distributed by sex and income as follows:

	Male	Female
All incomes (including unknown)	1, 200, 728	1, 297, 452
Relief	221, 925	230, 739
Nonrelief:		
Under $1,000	270, 058	306, 660
$1,000 to $1,500	261, 372	276, 294
$1,500 to $2,000	191, 796	202, 105
$2,000 and over	210, 620	228, 242

Rates for persons of unknown income, based on 362 cases among 98,369 persons, are not shown.

[g] Based on persons 15–64 years of age, distributed by age and employment status as follows:

	Total 15–64 years	15–24 years	25–44 years	45–64 years
Employed male workers	547, 384	74, 458	305, 120	167, 806
Employed female workers	209, 214	64, 500	108, 833	35, 881
Housewives	504, 166	49, 223	276, 294	178, 649

[h] Based on females 15–64 years of age distributed by age and employment status as in footnote *g*.

[i] Based on females 15–64 years of age distributed by employment status, age, and income, as follows:

	Employed female workers				Housewives			
	Total 15–64 years	15–24 years	25–44 years	45–64 years	Total 15–64 years	15–24 years	25–44 years	45–64 years
All incomes	209, 214	64, 500	108, 833	35, 881	504, 166	49, 223	276, 294	178, 649
Relief	15, 356	5, 998	6, 946	2, 412	84, 186	10, 934	46, 501	26, 751
Nonrelief:								
Under $1,000	57, 508	14, 532	30, 421	12, 555	119, 190	16, 589	59, 049	43, 552
$1,000 to $1,500	45, 506	14, 179	23, 912	7, 415	119, 889	12, 714	68, 537	38, 638
$1,500 to $2,000	37, 553	12, 549	19, 449	5, 555	87, 477	5, 600	51, 196	30, 681
$2,000 and over	53, 291	17, 242	28, 105	7, 944	93, 424	3, 386	51, 011	39, 027

[j] Based on 504,166 housewives distributed by age and income as in footnote *i*.

[k] Excludes home accidents unknown as to age of persons.

[l] Excludes cases unknown as to age of persons.

[m] "All other means" here excludes machinery, and firearms and fireworks, whereas "All other means" in table 9 includes these categories.

[n] Based on 2,502,391 white and colored persons: 1,201,992 males and 1,300,399 females.

COURT DECISION ON PUBLIC HEALTH

Award under workmen's compensation act for pneumonia denied.—(Missouri Supreme Court, Division No. 1; *Joyce et al.* v. *Luse-Stevenson Co. et al.*, 139 S.W.2d 918; decided March 6, 1940.) A proceeding under the Missouri Workmen's Compensation Act was brought to secure an award for the death of an employee from pneumonia. It appeared that in connection with the construction of a building the deceased, a plasterer, had been employed in putting concrete waterproofing material on the walls of a sub-basement and on certain pits and depressions below its floor. A considerable amount of seep water had gotten into the sub-basement, covering a large part of the floor thereof. Although a platform was provided for the workmen, it was necessary for them to get their feet and the lower portions of their legs wet. The deceased had worked above the water level for several weeks but he spent his last two working days in the sub-basement. He became acutely ill with pneumonia and his death ensued therefrom.

The compensation law defined accident as "An unexpected or unforeseen event happening suddenly and violently, with or without human fault and producing at the time objective symptoms of an injury." Injury was defined as "violence to the physical structure of the body and such disease or infection as naturally results therefrom." The law then provided that these terms should not include either occupational disease in any form or any contagious or infectious disease contracted during the course of the employment.

The supreme court had before it for decision the question whether there was an accident within the meaning of that term as used in the compensation act, and the view taken by it was that there was no such accident. After setting forth the definitions contained in the law the court said that the event which constituted an accident was thus clearly a happening or occurrence in part at least external to the body itself and that the physiological changes which may result in the workman's own body are consequences of the accidental event. It was stated that where, as in the instant case, the disease resulted from exposure in the ordinary course of the employee's work the weight of authority was to the effect that the disease was not compensable.

DEATHS DURING WEEK ENDED OCTOBER 26, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 26, 1940	Corresponding week, 1939
Data from 87 large cities of the United States:		
Total deaths	7,991	7,787
Average for 3 prior years	7,944	
Total deaths, first 43 weeks of year	357,121	351,070
Deaths under 1 year of age	445	459
Average for 3 prior years	503	
Deaths under 1 year of age, first 43 weeks of year	21,318	21,235
Data from industrial insurance companies:		
Policies in force	64,801,951	66,574,186
Number of death claims	10,615	11,598
Death claims per 1,000 policies in force, annual rate	8.6	9.1
Death claims per 1,000 policies, first 43 weeks of year, annual rate	9.7	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 2, 1940

Summary

For the current week, slight increases over the preceding week were recorded for influenza, measles, meningococcus meningitis, scarlet fever, and whooping cough, and decreases for diphtheria, poliomyelitis, smallpox, and typhoid fever, while the incidence of influenza, measles, poliomyelitis, and whooping cough was slightly above the 5-year (1935–39) median expectancy.

For 1940 to date (44 weeks), the cumulative totals for only influenza and poliomyelitis are above the cumulative 5-year medians.

The States reporting the largest numbers of cases of influenza were South Carolina, with 331, and Texas, with 271. These States also reported the highest incidence in the immediately preceding weeks.

Current reports include 2 cases of undulant fever, 1 case of tularaemia (in Arizona), and 50 cases of endemic typhus fever, of which 20 occurred in Georgia and 13 in Texas. (Preliminary reports of diseases other than the 9 included in the weekly table do not include all of the States.)

For the current week the Bureau of the Census reports 7,967 deaths in 88 major cities of the United States, as compared with 8,074 for the preceding week and with a 3-year (1937–39) average of 7,852 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended November 2, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Nov. 2, 1940	Nov. 4, 1939		Nov. 2, 1940	Nov. 4, 1939		Nov. 2, 1940	Nov. 4, 1939		Nov. 2, 1940	Nov. 4 1939	
NEW ENG.												
Maine	1	0	1	1	------	------	75	7	30	0	0	0
New Hampshire	0	0	0	------	------	------	0	2	2	0	0	0
Vermont	0	0	0	------	------	------	3	31	31	0	0	0
Massachusetts	4	8	8	------	------	------	173	165	66	2	0	0
Rhode Island	0	0	1	------	------	------	0	42	27	1	0	0
Connecticut	0	2	2	------	4	2	3	7	12	0	0	0
MID. ATL.												
New York	11	18	22	[1] 10	[1] 3	[1] 10	200	162	128	0	2	5
New Jersey	7	18	11	4	6	12	134	6	17	0	1	1
Pennsylvania	15	33	36	------	------	------	531	26	40	0	4	4
E. NO. CEN.												
Ohio	18	43	48	20	7	7	25	34	34	1	0	3
Indiana	7	33	33	5	7	28	9	10	10	1	2	2
Illinois	27	30	41	3	10	12	147	20	20	2	0	2
Michigan [2]	7	9	22	2	4	2	127	71	50	3	0	1
Wisconsin	1	1	2	27	24	24	205	33	33	1	0	0
W. NO. CEN.												
Minnesota	2	4	9	------	7	1	9	28	16	1	1	0
Iowa	9	4	5	2	------	------	51	34	3	1	2	0
Missouri	19	13	23	5	------	19	1	5	8	0	0	2
North Dakota	2	1	2	------	------	------	4	1	1	1	0	0
South Dakota	1	0	3	------	------	------	4	9	3	0	0	0
Nebraska	2	6	6	------	4	1	9	1	3	0	0	0
Kansas	5	6	10	1	2	2	5	38	4	1	1	0
SO. ATL.												
Delaware	0	0	0	------	------	------	3	3	3	0	0	0
Maryland [2]	3	16	10	2	7	4	6	6	17	0	0	1
Dist. of Col.	1	2	5	------	------	------	3	0	0	0	0	1
Virginia [3]	22	89	66	67	57	------	20	4	28	1	0	2
West Virginia [2]	4	21	27	6	19	10	4	4	8	1	1	1
North Carolina [3]	49	165	142	4	2	4	6	110	101	0	0	3
South Carolina [3]	20	28	28	331	300	192	3	1	4	1	1	1
Georgia [3]	9	46	44	14	35	------	2	1	1	2	2	1
Florida	7	11	19	1	2	2	1	14	14	0	1	0
E. SO. CEN.												
Kentucky	18	24	37	2	2	14	59	1	20	2	2	2
Tennessee [3]	9	32	32	6	11	27	5	6	3	0	0	2
Alabama [3]	12	39	41	14	70	46	5	0	4	5	1	1
Mississippi [2 3]	7	14	20	------	------	------	------	------	------	0	1	0
W. SO. CEN.												
Arkansas	10	19	25	23	51	48	2	2	2	0	0	1
Louisiana [3]	21	18	18	2	3	3	1	2	2	0	2	1
Oklahoma	19	22	22	31	33	33	0	1	2	0	0	1
Texas [3]	30	47	63	271	218	189	10	28	18	0	2	1
MOUNTAIN												
Montana	5	0	0	7	17	4	3	68	13	1	0	1
Idaho	1	0	0	5	------	2	2	5	5	0	0	0
Wyoming	0	4	0	1	1	------	1	41	5	0	0	0
Colorado	2	7	7	7	13	------	24	21	5	0	0	0
New Mexico	0	0	4	------	1	1	6	2	8	0	0	0
Arizona	7	4	3	68	32	33	22	3	1	0	0	0
Utah [2]	0	2	1	4	2	------	3	12	12	0	1	1
Nevada	0	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	6	5	2	------	------	------	5	309	25	1	0	0
Oregon	3	0	2	17	15	17	6	24	9	0	2	0
California [3]	11	18	35	13	27	22	25	149	114	2	0	2
Total	414	857	1,081	976	996	847	1,942	1,549	1,549	31	29	62
44 weeks	12,632	18,657	21,944	175,897	157,887	146,188	239,512	356,340	356,340	1,405	1,689	4,794

See footnotes at end of table.

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Telegraphic morbidity reports from State health officers for the week ended November 2, 1940, and comparison with corresponding week of 1939 and 5-year median— Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Nov. 2, 1940	Nov. 4, 1939		Nov. 2, 1940	Nov. 4, 1939		Nov. 2, 1940	Nov. 4, 1939		Nov. 2, 1940	Nov. 4, 1939	
NEW ENG.												
Maine	0	0	1	4	18	11	0	0	0	1	3	2
New Hampshire	0	0	0	1	2	3	0	0	0	0	0	0
Vermont	0	0	0	6	2	4	0	0	0	2	0	0
Massachusetts	3	2	2	80	69	103	0	0	0	2	0	1
Rhode Island	0	0	0	4	4	12	0	0	0	0	0	0
Connecticut	0	0	0	21	30	30	0	0	0	3	3	2
MID. ATL.												
New York	9	23	10	150	134	238	0	0	0	8	15	15
New Jersey	1	4	4	73	60	60	0	0	0	3	3	2
Pennsylvania	8	13	9	161	288	288	0	0	0	7	12	18
E. NO. CEN.												
Ohio	23	10	2	178	227	256	0	2	0	21	14	15
Indiana	11	5	2	43	129	129	1	3	3	1	4	4
Illinois	31	6	6	266	202	243	4	2	2	3	14	16
Michigan [1]	49	14	12	95	169	187	3	0	0	3	20	5
Wisconsin	36	3	3	121	125	140	0	0	3	1	0	1
W. NO. CEN.												
Minnesota	18	15	1	57	68	95	0	3	3	0	0	0
Iowa	21	21	6	66	54	70	0	8	8	2	0	1
Missouri	1	1	2	39	70	113	0	0	1	9	5	5
North Dakota	0	0	1	4	21	33	6	4	4	1	0	1
South Dakota	4	1	1	19	11	21	1	1	7	0	0	1
Nebraska	8	4	0	17	12	21	0	1	1	1	0	0
Kansas	12	2	2	60	64	99	0	1	1	2	3	2
SO. ATL.												
Delaware	0	1	0	7	7	6	0	0	0	0	1	1
Maryland [2]	1	2	2	41	44	51	0	0	0	4	5	8
Dist. of Col.	0	0	0	8	10	10	0	0	0	1	1	1
Virginia [3]	12	1	1	53	38	49	0	0	0	5	2	8
West Virginia [2]	25	10	0	50	87	87	0	0	0	5	15	10
North Carolina [3]	3	0	1	78	96	85	0	0	0	3	5	8
South Carolina [3]	0	1	0	44	25	11	0	0	0	3	20	7
Georgia [3]	0	1	1	38	30	24	0	0	0	7	11	11
Florida	1	0	0	4	11	11	0	0	0	2	4	1
E. SO. CEN.												
Kentucky	5	16	2	65	50	82	0	0	0	22	14	14
Tennessee [3]	0	0	2	23	63	49	2	6	1	1	10	10
Alabama [3]	0	0	1	38	46	26	0	0	0	4	5	5
Mississippi [2] [3]	0	0	1	14	9	18	0	0	0	4	0	6
W. SO. CEN.												
Arkansas	1	2	1	20	14	18	1	4	1	11	9	9
Louisiana [3]	7	0	0	8	4	11	2	0	0	6	3	7
Oklahoma	3	0	2	21	23	23	2	5	2	7	9	13
Texas [3]	2	8	3	37	28	66	0	2	2	9	14	29
MOUNTAIN												
Montana	3	0	0	13	26	31	0	0	3	4	1	1
Idaho	1	1	0	13	10	24	0	1	0	3	2	2
Wyoming	0	1	0	4	15	9	0	0	0	0	0	0
Colorado	2	6	1	9	31	35	1	6	2	3	3	4
New Mexico	0	3	2	4	8	13	0	0	0	1	2	11
Arizona	0	0	0	1	4	8	0	0	0	1	2	2
Utah [2]	3	5	1	4	19	19	0	0	0	0	3	0
Nevada	0			1			0			1		
PACIFIC												
Washington	15	1	1	25	38	38	1	0	3	2	1	3
Oregon	2	4	2	10	17	27	0	1	1	1	3	3
California [3]	9	20	11	62	147	149	1	5	0	2	18	7
Total	330	207	153	2,160	2,659	3,002	25	55	65	182	259	318
44 weeks	8,713	6,452	6,452	133,540	133,725	187,431	2,114	.8965	8,861	8,581	11,530	12,939

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 2, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough—week ended Nov. 2, 1940	Whooping cough—week ended Nov. 4, 1939	Division and State	Whooping cough—week ended Nov. 2, 1940	Whooping cough—week ended Nov. 4, 1939
NEW ENG.			SO. ATL.—continued		
Maine	27	22	Georgia [3]	11	20
New Hampshire	8	0	Florida	10	12
Vermont	3	47	E. SO. CEN.		
Massachusetts	172	93	Kentucky	96	64
Rhode Island	16	9	Tennessee [3]	20	47
Connecticut	86	73	Alabama [3]	19	32
MID. ATL.			Mississippi [2, 3]		
New York	431	318	W. SO. CEN.		
New Jersey	129	97	Arkansas	57	6
Pennsylvania	754	330	Louisiana [3]	12	11
E. NO. CEN.			Oklahoma	12	0
Ohio	343	91	Texas [3]	86	34
Indiana	10	26	MOUNTAIN		
Illinois	173	172	Montana	0	0
Michigan [2]	279	122	Idaho	9	1
Wisconsin	174	118	Wyoming	2	0
W. NO. CEN.			Colorado	31	8
Minnesota	123	48	New Mexico	10	36
Iowa	42	16	Arizona	2	8
Missouri	23	24	Utah [2]	21	58
North Dakota	28	36	Nevada	0	
South Dakota	6	5	PACIFIC		
Nebraska	13	2	Washington	53	5
Kansas	51	6	Oregon	8	33
SO. ATL.			California [3]	300	89
Delaware	32	7	Total	4,095	2,284
Maryland [3]	87	31			
Dist. of Col.	11	15	44 weeks	139,088	152,382
Virginia [3]	87	12			
West Virginia [2]	50	22			
North Carolina [3]	141	68			
South Carolina [3]	37	10			

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Nov. 2, 1940, 50 cases, as follows: Virginia, 1; North Carolina, 1; South Carolina, 2; Georgia, 20; Tennessee, 1; Alabama, 6; Mississippi, 3; Louisiana, 2; Texas, 13; California, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended October 19, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	174	74	25	272	419	671	4	329	48	866	-------
Current week [1]	77	59	12	491	240	526	4	285	34	1,176	-------
Maine:											
Portland	0	------	0	0	1	0	0	0	0	2	30
New Hampshire:											
Concord	0	------	0	0	1	0	0	0	0	0	8
Manchester	0	------	0	0	0	6	0	1	0	0	16
Nashua	0	------	0	0	2	1	0	0	0	0	12
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	6
Rutland	0	------	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	0	------	0	24	4	13	0	8	3	75	204
Fall River	1	------	0	0	1	9	0	1	0	4	27
Springfield	0	------	0	0	0	3	0	3	0	3	34
Worcester	0	------	0	45	4	1	0	0	0	0	39
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	16
Providence	1	------	0	1	2	0	0	2	0	5	57
Connecticut:											
Bridgeport	0	------	0	0	0	2	0	0	0	0	28
Hartford	0	------	0	0	1	1	0	0	0	0	38
New Haven	0	1	0	0	1	3	0	1	0	35	45
New York:											
Buffalo	0	------	1	5	3	4	0	3	0	8	116
New York	10	2	0	67	48	41	0	45	3	152	1,388
Rochester	0	------	0	0	0	6	0	1	0	19	45
Syracuse	0	------	0	0	2	0	0	1	0	2	45
New Jersey:											
Camden	0	------	0	22	0	7	0	0	0	1	29
Newark	0	------	0	3	3	4	0	7	0	13	94
Trenton	0	------	0	3	1	3	0	0	0	2	83
Pennsylvania:											
Philadelphia	0	------	0	156	7	34	0	17	7	104	369
Pittsburgh	0	4	2	2	7	15	0	6	2	18	163
Reading	0	------	0	1	2	0	0	0	0	31	20
Scranton	0	------	------	0	------	0	0	------	0	0	------
Ohio:											
Cincinnati	9	------	0	0	2	7	0	8	0	13	133
Cleveland	0	14	0	2	10	16	0	8	1	72	193
Columbus	0	------	0	0	2	4	0	2	0	20	83
Toledo	0	------	0	1	0	8	0	4	0	6	56
Indiana:											
Anderson	0	------	0	0	0	6	0	1	0	0	7
Fort Wayne	0	------	0	0	1	0	0	0	1	4	21
Indianapolis	3	------	0	1	4	9	0	3	0	11	81
Muncie	2	------	0	0	1	9	0	0	0	0	13
South Bend	0	------	0	1	0	0	0	1	0	0	24
Terre Haute	0	------	0	0	1	0	0	0	1	0	20
Illinois:											
Alton	0	------	0	0	0	1	0	0	0	0	8
Chicago	5	3	1	42	21	74	0	35	2	85	647
Elgin	0	------	0	0	2	0	0	0	0	2	10
Moline	0	------	0	0	0	0	0	0	0	0	14
Springfield	0	------	0	1	2	1	0	0	0	9	28
Michigan:											
Detroit	2	1	0	65	6	45	0	16	0	127	213
Flint	0	------	0	0	3	2	0	0	0	10	31
Grand Rapids	0	------	0	2	0	9	0	0	0	33	24
Wisconsin:											
Kenosha	0	------	0	1	0	0	0	0	0	2	8
Madison	0	------	0	0	0	0	0	0	0	4	15
Milwaukee	0	------	0	9	3	17	0	0	0	19	96
Racine	0	------	0	0	0	7	0	0	0	1	12
Superior	0	------	0	1	0	0	0	1	1	0	9

[1] Figures for Barre estimated; report not received.

City reports for week ended October 19, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	-------	0	0	1	2	3	0	0	0	18
Minneapolis	0	-------	0	0	4	13	0	1	1	13	88
St. Paul	0	-------	0	0	3	8	0	1	0	6	57
Iowa:											
Cedar Rapids	0	-------	-------	0	-------	2	0	-------	0	0	-------
Davenport	0	-------	-------	0	-------	2	0	-------	0	0	-------
Des Moines	2	-------	0	0	0	6	0	0	0	0	21
Sioux City	0	-------	-------	0	-------	1	0	-------	0	3	-------
Waterloo	0	-------	-------	0	-------	4	0	-------	0	0	-------
Missouri:											
Kansas City	2	-------	0	0	1	2	0	5	1	5	90
St. Joseph	0	-------	0	0	2	1	0	1	0	0	22
St. Louis	4	-------	0	2	7	11	0	3	1	23	157
North Dakota:											
Fargo	0	-------	0	0	1	0	0	0	0	6	14
Grand Forks	0	-------	-------	0	-------	0	0	-------	0	5	-------
Minot	0	-------	-------	0	-------	0	0	-------	0	0	-------
South Dakota:											
Aberdeen	0	-------	-------	0	-------	1	0	-------	0	0	-------
Nebraska:											
Lincoln	1	-------	-------	0	-------	4	1	-------	0	0	-------
Omaha	1	-------	0	1	2	10	1	2	0	1	40
Kansas:											
Lawrence	0	-------	0	0	0	0	0	0	0	0	1
Topeka	0	-------	0	0	1	15	0	0	0	1	9
Wichita	0	-------	0	1	5	1	0	1	0	9	22
Delaware:											
Wilmington	1	-------	0	2	4	0	0	1	0	8	28
Maryland:											
Baltimore	2	1	0	2	3	10	0	8	2	66	185
Cumberland	0	1	0	0	0	2	0	0	0	0	19
Frederick	0	-------	0	0	0	0	0	0	1	2	7
Dist. of Col.:											
Washington	0	2	2	0	6	14	0	16	0	2	169
Virginia:											
Lynchburg	2	-------	0	0	0	1	0	0	0	3	9
Norfolk	0	1	0	0	3	1	0	1	0	0	25
Richmond	1	-------	1	1	0	1	0	2	1	0	54
Roanoke	0	-------	0	9	1	0	0	1	0	10	19
West Virginia:											
Charleston	0	-------	0	0	0	1	0	1	1	0	17
Wheeling	0	-------	0	0	1	0	0	0	0	2	17
North Carolina:											
Gastonia	0	-------	-------	0	-------	0	0	-------	0	0	-------
Raleigh	1	-------	0	0	0	0	0	1	0	0	17
Wilmington	3	-------	0	0	0	0	0	2	0	0	14
Winston-Salem	0	-------	0	1	3	2	0	0	0	12	18
South Carolina:											
Charleston	0	7	1	0	0	0	0	0	0	0	18
Florence	3	19	0	2	1	0	0	0	0	2	4
Greenville	0	-------	0	0	0	1	0	0	0	0	5
Georgia:											
Atlanta	2	6	0	1	1	17	0	7	0	1	95
Brunswick	0	-------	0	0	1	0	0	1	0	0	5
Savannah	0	4	0	0	1	1	0	1	0	1	35
Florida:											
Miami	0	1	0	0	2	1	0	0	0	0	26
Tampa	1	-------	0	0	0	0	0	0	0	1	18
Kentucky:											
Ashland	0	-------	0	0	0	0	0	1	0	0	12
Covington	0	-------	0	3	0	2	0	2	0	0	17
Lexington	0	-------	0	9	0	0	0	0	0	4	12
Louisville	0	-------	0	1	4	18	0	0	0	13	75
Tennessee:											
Knoxville	0	-------	0	0	1	3	0	1	0	3	23
Memphis	1	-------	0	0	1	9	0	1	0	7	71
Nashville	0	-------	0	1	3	3	0	2	0	10	41
Alabama:											
Birmingham	3	4	0	3	4	3	0	1	1	0	53
Mobile	0	-------	0	0	1	0	0	3	0	0	23
Montgomery	0	-------	-------	0	-------	2	0	-------	0	0	-------

City reports for week ended October 19, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Arkansas:											
Fort Smith	1			0		1	0		0	0	
Little Rock	0		0	0	1	0	0	1	0	1	
Louisiana:											
Lake Charles	1		0	0	1	1	0	0	0	0	6
New Orleans	2	2	0	0	0	3	0	10	0	5	136
Shreveport	4		0	0	0	2	0	1	0	0	20
Oklahoma:											
Oklahoma City	1		0	0	3	9	0	0	0	0	38
Tulsa	1		0	0	0	3	0	1	1	7	24
Texas:											
Dallas	3	1	1	0	0	3	0	1	0	0	59
Fort Worth	0		0	0	0	0	0	1	1	4	30
Galveston	0		0	0	0	0	0	0	0	0	13
Houston	1		1	0	5	3	0	5	0	1	84
San Antonio	0		0	0	3	4	0	6	0	2	48
Montana:											
Billings	0		0	0	2	1	0	0	0	0	6
Great Falls	1		0	0	1	0	0	0	0	0	9
Helena	0		0	0	0	1	0	0	0	0	4
Missoula	0		0	0	1	2	0	0	0	0	8
Idaho:											
Boise	0		0	0	1	0	0	0	0	0	11
Colorado:											
Colorado Springs	0		0	1	0	0	0	3	0	2	9
Denver	4		0	2	5	1	0	4	0	10	84
Pueblo	0		0	0	2	0	0	0	0	0	9
New Mexico:											
Albuquerque	0		0	0	1	0	0	4	2	0	20
Utah:											
Salt Lake City	0		0	1	0	0	0	0	1	2	32
Washington:											
Seattle	5		0	1	1	6	0	1	0	6	72
Spokane	0		0	0	2	7	0	0	1	0	32
Tacoma	0		0	2	1	4	0	1	0	1	38
Oregon:											
Portland	3	2	0	2	4	2	0	2	0	1	63
Salem	0			0		0	0		0	0	
California:											
Los Angeles	2	5	2	6	3	16	0	12	1	43	277
Sacramento	0		0	0	4	2	0	2	0	3	29
San Francisco	0	1	0	1	8	7	0	10	1	33	153

State and city	Meningitis, meningococcus		Polio-mye-litis cases
	Cases	Deaths	
New York:			
New York	0	0	5
New Jersey:			
Camden	0	0	1
Newark	0	0	2
Trenton	0	0	2
Pennsylvania:			
Philadelphia	0	0	2
Ohio:			
Cincinnati	0	0	8
Cleveland	0	0	1
Indiana:			
Fort Wayne	0	0	1
Indianapolis	0	0	1
South Bend	0	0	2
Illinois:			
Chicago	0	0	16
Michigan:			
Detroit	0	0	2
Grand Rapids	0	1	5
Wisconsin:			
Madison	0	0	3
Racine	0	0	2
Minnesota:			
Minneapolis	0	0	1
St. Paul	0	0	4
Iowa:			
Davenport	0	0	1
Des Moines	0	0	3
Waterloo	0	0	1
Missouri:			
Kansas City	0	0	2
St. Joseph	0	0	3
St. Louis	0	0	1
Nebraska:			
Omaha	0	0	1
Kansas:			
Topeka	0	0	3
Virginia:			
Lynchburg	1	0	1
Roanoke	0	0	1
Kentucky:			
Louisville	0	0	2
Alabama:			
Birmingham	0	0	1
Louisiana:			
New Orleans	0	0	1
Shreveport	0	0	1
Oklahoma:			
Oklahoma City	0	0	2
Colorado:			
Denver	0	0	1
New Mexico:			
Albuquerque	0	0	1
Utah:			
Salt Lake City	0	0	1
Washington:			
Seattle	0	0	2
Tacoma	0	0	1
California:			
Los Angeles	0	0	5
Sacramento	0	0	1
San Francisco	0	0	1

Pellagra.—Cases: Charleston, S. C., 2; Atlanta, 1; Savannah, 1; Birmingham, 1; Montgomery, 1; Albuquerque, 1; San Francisco, 1.

Rabies in man.—Deaths: Providence, 1.

Typhus fever.—Cases: New York, 1; Savannah, 3; Miami, 1; Mobile, 1; Montgomery, 2; Lake Charles, 1; Fort Worth, 1; Houston, 2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended September 28 and October 5, 1940.—During the weeks ended September 28 and October 5, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Week ended September 28, 1940

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					1		1			2
Chickenpox		9		46	100	14	16	13	36	234
Diphtheria			2	33		3		1		39
Dysentery				5	1					6
Influenza		29	1		5				57	92
Lethargic encephalitis							1			1
Measles		3	2	23	93	49	12	12	41	235
Mumps		3	1	3	74	11			15	107
Pneumonia		8			7	1			5	21
Poliomyelitis				5	4	1				10
Scarlet fever			2	72	88	14	3	4	8	191
Smallpox							7			7
Tuberculosis		4	7	60	32	3	3			109
Typhoid and paratyphoid fever	1	1	4	28	13	5	5	1	2	60
Whooping cough		6	26	174	102	17	9	26	2	362

Week ended October 5, 1940

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					2					2
Chickenpox				52	97	23	39	7	29	247
Diphtheria		11	2	19	8	2	6	6		54
Dysentery				1	6		1		2	10
Influenza	4	17			10				14	45
Measles		6		56	153	57	72	48	13	405
Mumps				9	73	9	1	1	8	101
Pneumonia	1	4			7	1			3	16
Poliomyelitis				4	12					16
Scarlet fever		8		54	99	16	14	24	10	225
Smallpox							1			1
Trachoma									1	1
Tuberculosis		4	7	76	33	95	46			261
Typhoid and paratyphoid fever			4	49	9	5			2	69
Whooping cough				52	119	29	21	25	36	282

FINLAND

Communicable diseases—4 weeks ended August 10, 1940.—During the 4 weeks ended August 10, 1940, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	181	Poliomyelitis	128
Dysentery	33	Scarlet fever	239
Influenza	785	Typhoid fever	27
Paratyphoid fever	279		

HAWAII

Influenza.—For the week ended November 1, 1940, a total of 2,194 cases of influenza, with 1 death, was reported in the Territory of Hawaii. The disease was stated to be epidemic on September 26. Since that date, cases and deaths have been reported as follows:[1]

	Week ended—				
	Oct. 4	Oct. 11	Oct. 18	Oct. 25	Nov. 1
Cases	1,800	2,498	1,532	1,585	2,194
Deaths	2	4	0	0	1

PANAMA CANAL ZONE

Notifiable diseases—July–September 1940.—During the months of July, August, and September, 1940, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	July		August		September	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	7		4		5	
Diphtheria	7	1	6		10	
Dysentery (amoebic)	11	2	11	1	6	
Dysentery (bacillary)	5	1	1		1	1
Leprosy	1	1		1		
Malaria	374	10	101	4	138	2
Measles	16		1		3	
Meningitis, meningococcus					1	1
Mumps	1		4		1	
Paratyphoid fever	5		38		3	
Pneumonia		17		36		31
Tuberculosis		24		44		24
Typhoid fever	2	2	1			
Whooping cough	[2] 3				[1] 1	

[1] See Public Health Reports, Oct. 25, 1940, p. 1972.
[2] In the Canal Zone only.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of October 25, 1940, pages 1973–1976. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China.—During the week ended October 19, 1940, cases of cholera were reported in China as follows: Hong Kong, 6; Macao, 25; Shanghai, 20.

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Public Health Reports

VOLUME 55 **NOVEMBER 15, 1940** NUMBER 4

IN THIS ISSUE

Unit on Gerontology in the National Institute of Health

An Outbreak Due to the "Newcastle Dysentery Bacillus"

Technique of Agglutination Test for *Trypanosoma cruzi*

Virulent Rocky Mountain Spotted Fever Virus From Ticks

Illness Among Industrial Workers, Second Quarter, 1940

U.S. PUBLIC HEALTH SERVICE 1798

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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UNIT ON GERONTOLOGY IN THE NATIONAL INSTITUTE OF HEALTH

The National Institute of Health of the United States Public Health Service is organizing a new unit for research into some of the many problems of aging. With the conspicuous shift to greater age in the population, senescent individuals are becoming increasingly significant in the national economy and defense. Preventive medicine must attack the practical problems of the rising proportion of deaths attributable to diseases of middle and later life and energetically attempt to augment the health and vigor of those past the meridian. Aging is a continuous biologic phenomenon which starts upon creation of a new individual and continues at variable rates until death. The problems of aging (gerontology) are not limited to the diseases of the aged (geriatrics), for the latter are the consequences of senescence. In man probably the most significant period of life for gerontologic study is late maturity, approximately the two decades between 40 and 60.

The problems of aging are logically divisible into three major fields of investigation: (1) The biology of senescence as a process, (2) the human clinical problems of aging and of diseases characteristically associated with advancing years which include the mental changes of senescence and senectitude as well as the physical changes, and (3) the socio-economic problems of a shifting age distribution in the population. The National Institute of Health is concerned with the first two of these divisions of the science.

In order to advise this new unit, there has been formed a National Advisory Committee on Gerontology, representative of the scientific thought of the Nation. The membership of this Advisory Committee includes:

Dr. L. R. Thompson, Director, National Institute of Health, U. S. Public Health Service.

Dr. Anton J. Carlson, Physiologist, University of Chicago, National Research Council.

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patients in the outbreak were under medical care and isolated soon after the onset of the symptoms. Occasionally there was delay, since a few individuals concealed their symptoms in the hope of avoiding surveillance. Sixteen who were very mildly ill did not come under observation until they were later found to have positive stool cultures. In view of the unusual nature of the outbreak, the symptoms were observed with particular interest by the nurse-patients, and fully recorded by the physicians in charge.

TABLE 1.—*Prominent symptoms and findings in 97 cases of acute diarrhea due to the "Newcastle dysentery bacillus"*

Symptoms and findings	Number of cases	Percent of total	Symptoms and findings	Number of cases	Percent of total
Diarrhea	97	100	Weakness	38	39
Abdominal pain	85	88	Anorexia	35	36
Fever	76	78	Malaise	29	30
Headache	68	70	General aching	26	27
Nausea	59	61	Abdominal tenderness	19	20
Chilliness	46	47	Mucus in stool	16	16
Vomiting	43	44	Blood in stool	10	10
Backache	41	42	Rigor	8	8

The symptoms and findings as abstracted from the hospital records and supplemented to a limited extent by individual inquiries are summarized in table 1. Diarrhea of some degree, usually mild, occurred in all cases; this was almost always associated with griping pains. The number of stools was recorded in 84 cases. On the day of the most severe symptoms 60 patients had between 4 and 9 stools, 11 had between 10 and 19, and 3 patients had more than 20 stools. Commonly the stools were watery; mucus was noted in 16 of the cases and gross blood in 10; the latter appeared infrequently and in small amounts. The bloody mucoid discharges of bacillary dysentery, as the disease is usually described, were strikingly absent. Nausea, vomiting, anorexia, weakness, and malaise were all quite common complaints, but were rarely prominent. The symptoms usually most in evidence were those ordinarily associated with acute febrile disorders. These included headache, backache, general aching and chilliness, and the rarer but more impressive true rigors, which occurred in 8 cases. Temperature records were available in 79 cases. The maximum oral temperatures were:

99°– 99.9° in 6 cases
100°–100.9° in 17 cases
101°–101.9° in 19 cases
102°–102.9° in 10 cases
103°–103.9° in 13 cases
104°–104.9° in 12 cases
105°–105.9° in 2 cases

There were prominent signs of meningeal irritation in 3 cases and in 6 the spleen was easily palpable. In one case the clinical appear-

ances suggested appendicitis superimposed upon bacillary dysentery.

Clinical laboratory tests were performed in approximately one-half of the cases. The total white blood cells and the proportion of polymorphonuclear leucocytes were often increased. In some instances the feces contained blood and pus in microscopic quantities only. The guaiac test was performed on stools of 22 individuals who had reported no gross blood; in 9 it was strongly positive, in 7 weakly positive, and in 6 entirely negative.

In its usual course the illness had an abrupt onset followed by moderately severe symptoms for 2, 3, or 4 days, and a period of convalescence of about the same duration. As shown in table 2 the illness was more prolonged in some cases. Two patients were acutely ill for more than 2 weeks; at the end of 1 month 3 were still convalescing in the hospital. All cases terminated in complete recovery.

TABLE 2.—*Duration of illness in cases of acute diarrhea due to the "Newcastle dysentery bacillus"*

Duration of illness in days	Number of cases: From onset to termination of acute symptoms	Number of cases: From onset to complete convalescence	Duration of illness in days	Number of cases: From onset to termination of acute symptoms	Number of cases: From onset to complete convalescence
1	14	9	10	1	1
2	19	6	11	0	0
3	18	5	12	1	0
4	22	10	13	0	2
5	6	11	14 and over	2	5
6	6	9	Not recorded	4	4
7	1	19			
8	2	9	Total	97	97
9	1	7			

The clinical features of these cases differed somewhat from those observed in endemic Flexner and Sonne infections. In the latter the predominant symptoms were diarrhea and abdominal pain. The temperature was often elevated, but backache, general aching, and chilliness were uncommon, and in uncomplicated cases in adults rigors were not seen. The symptoms in the Newcastle infections also differed notably from those in a comparable outbreak due to *Salmonella typhi murium* in which diarrhea was severe, nausea and vomiting persistent, and abdominal tenderness and rigidity marked. These clinical variations, apparent in the study of groups of cases were, however, neither of a type nor a degree which would permit reliable differential diagnosis in individual cases.

LABORATORY OBSERVATIONS

Bacteriology.—In the study and control of this outbreak more than 4,000 fecal specimens were examined. The early bacteriological

Carriers of other varieties of pathogenic *Shigella* were strikingly rare. A Flexner organism was repeatedly isolated from one individual and from another a dispar strain. Typical Sonne organisms were not detected. The nonpathogenic *Shigella alkalescens* was found frequently.

Serology.—Blood for serological examination was collected during the third week after the probable date of exposure. Specimens were obtained from 77 cases and 14 carriers and for control purposes from 34 other nurses or employees who had several stool cultures negative for the "Newcastle dysentery bacillus." One hundred sera from the Wassermann laboratory of the New York City Department of Health were also used as controls. Six months later blood was again drawn from available cases and carriers whose serum had shown significant agglutination of the Newcastle organism.

The antigens employed in the tests were saline suspensions of approximately 600,000,000 living organisms per cubic centimeter, comparable in turbidity to tube 2 of McFarland's nephelometer. These antigens were prepared from smooth strains which had been transferred repeatedly. Six organisms were used. These included three strains of the "Newcastle dysentery bacillus," the gas-producing variety from the Bureau of Standards Laboratory, Oxford, England, a nongas-producing strain isolated during the outbreak, and the homologous organism when available. The other three organisms used were *Shigella dysenteriae* Flexner Y,, obtained from the Bureau of Standards Laboratory, Oxford, England, *Shigella dysenteriae* Sonne and *Salmonella schottmülleri* (group phase), both from the laboratory of the New York City Department of Health. The 100 control Wassermann sera were set up with only one of the Newcastle antigens, that prepared from the type strain obtained from England. Throughout, six serum dilutions were used in the range from 1 to 10 to 1 to 320 inclusive. The tests were held in the waterbath at 56° C. for 4 hours and at a room temperature until read at the end of 20 to 24 hours.

Findings were recorded as totally negative or as positive in one of four degrees. The 4 plus reading signified complete clearing and moderately large persisting clumps, the 3 plus was similar except with slight turbidity of the supernatant fluid, 2 plus indicated a little clearing with definite clumping, and the 1 plus little or no clearing and only small clumps. For simplicity in tabulation we included the 3 and 4 plus in one group designated "complete agglutination" in a specified titer. In those tests with "complete agglutination" we disregarded any 1 or 2 plus readings. The tests which gave nothing more than a 1 or 2 plus reaction in any dilution were designated in the tables as "partial agglutination." Specimens with "no agglutination" were totally negative in all serum dilutions employed.

The titers obtained with the three Newcastle organisms were relatively uniform. The homologous organisms showed some tendency to yield lower readings, probably due to the fact that these organisms had not been transferred as frequently as the other two. In the tables we have shown only the readings on the Oxford strain of the "Newcastle dysentery bacillus."

In table 4 the observations on cases, carriers, and controls for each of the four organisms are shown. Of the 64 cases positive bacteriologically, 5 (7.8 percent) failed to show any agglutination, and 12 (18.7 percent) yielded only partial agglutination. Of the 47 (73.5 percent) cases which gave "complete agglutination," the maximum titer was 1:10 or 1:20 in 11 (17.2 percent), but was 1:40 or above in 36 (56.3 percent). These results are to be compared with the 134 controls which had no complete agglutination in titers of 1:40 or above; only 1 was positive in 1:20 and 2 in 1:10. The more frequent occurrence of partial agglutinations in the hospital controls suggests that some of these may have had transient contact with the Newcastle organisms. The cases negative bacteriologically presumably had a less prolonged exposure to the Newcastle organisms than did those positive bacteriologically. It may also be assumed that carriers tend to have a less intimate contact with the organisms than do cases. For these reasons it would be expected, as was found, that the titers on the negative cases and carriers would be less than on the positive cases. The two cases negative bacteriologically with the higher titers both had relatively severe and prolonged illnesses. The one carrier with a titer of 1:160 was found on special inquiry to have had suggestive symptoms "when the others were becoming ill."

It has repeatedly been observed that Flexner strains are not infrequently agglutinated in titers up to 1:40 by the serum of normal individuals. Occasionally, as in this series, higher titers are found. The sera from the Newcastle cases agglutinated *Shigella dysenteriae* Flexner Y in higher titers than the control sera. It is believed that this is the result of a common antigenic fraction, as has been suggested by Boyd (*3*). In contrast, the *Shigella dysenteriae* Sonne and the *Salmonella schottmülleri* were rarely agglutinated, as is shown in the table.

After an interval of 6 months second specimens of blood were obtained from 37 of the cases or carriers who had the higher titers on the original examination. The early and the late findings are shown in table 5. It is evident that in 6 months or less the agglutinins for the Newcastle organisms which were developed almost entirely disappeared.

TABLE 4.—*Agglutination reactions in the sera of cases, carriers, and healthy controls*

Antigen	Groups tested	Number examined	No agglutination		Partial agglutination		Complete agglutination		Number with complete agglutination in maximum titers of:					
			Number	Percent	Number	Percent	Number	Percent	1:10	1:20	1:40	1:80	1:160	1:320
"Newcastle dysentery bacillus."	Cases positive bacteriologically	61	5	7.8	12	18.7	47	73.5	8	3	22	9	5	0
	Cases negative bacteriologically	13	8	61.5	1	7.7	4	30.8	1	0	1	0	1	1
	Carriers	14	8	57.1	1	7.2	5	35.7	1	2	1	0	1	0
	Hospital controls	34	27	79.4	6	17.7	1	2.9	1	0	0	0	0	0
	City controls	100	92	92.0	6	6.0	2	2.0	1	1	0	0	0	0
Shigella dysenteriae Flexner Y.	Cases positive bacteriologically	64	17	26.7	21	32.7	26	40.6	9	3	8	5	1	0
	Cases negative bacteriologically	13	4	30.8	5	38.4	4	30.8	1	1	0	1	1	0
	Carriers	14	6	42.9	5	35.7	3	21.4	1	0	1	1	0	0
	Hospital controls	34	22	64.8	6	17.6	6	17.6	3	1	1	0	1	0
	City controls	100	69	69.0	12	12.0	19	19.0	7	7	4	1	0	0
Shigella dysenteriae Sonne.	Cases positive bacteriologically	59	52	88.1	6	10.2	1	1.7	1	0	0	0	0	0
	Cases negative bacteriologically	11	10	91.0	0	0	1	9.0	1	0	0	0	0	0
	Carriers	9	9	100	0	0	0	0	0	0	0	0	0	0
	Hospital controls	31	31	100	0	0	0	0	0	0	0	0	0	0
	City controls	100	95	95.0	4	4.0	1	1.0	1	0	0	0	0	0
Salmonella schottmülleri (group phase).	Cases positive bacteriologically	64	54	84.4	6	9.4	4	6.2	1	2	1	0	0	0
	Cases negative bacteriologically	13	12	92.3	1	7.7	0	0	0	0	0	0	0	0
	Carriers	14	11	78.6	3	21.4	0	0	0	0	0	0	0	0
	Hospital controls	34	33	97.0	1	3.0	0	0	0	0	0	0	0	0
	City controls	100	100	100	0	0	0	0	0	0	0	0	0	0

The major significance of these serological observations is in establishing with relative certainty the etiological role of the Newcastle organisms in this outbreak. It appears also that the complete agglutination of this organism in titers of 1:40 or above has diagnostic value in the examination of New York City residents.

TABLE 5.—*Comparison of the agglutination titers for the "Newcastle dysentery bacillus" in 37 cases and carriers who were examined 3 weeks following exposure and 6 months thereafter*

Date examined	Number examined	Number of cases						
		No agglutination	Maximum titers with complete agglutination					
			1:10	1:20	1:40	1:80	1:160	1:320
July 1939	37	0	6	1	18	6	6	0
January 1940	37	34	2	1	0	0	0	0

EPIDEMIOLOGY

The institution.—The hospital in which the outbreak occurred is an institution widely known for the excellence of its physical plant and the high qualifications of its medical and administrative staffs. The private pavilion and nurses' residence are separated from the main hospital. Each of these divisions has an independent kitchen with adjoining dining rooms. All foods are purchased in common and dispensed from a central supply, but, with the exception of bread and pastries, are prepared in the three separate kitchens. In addition to the latter, there is also a diet kitchen for the preparation of special menus, and a kitchen for the pediatric service.

Onset.—The chronological record of the outbreak is shown in table 6. Most of the illnesses began during the 3 days from June 21 to 23, inclusive, though in a few instances the onset was slightly later. One is also recorded for June 20 but the history in this case was subject to error. The individual was admitted to the hospital on July 2 after a positive stool culture, and only then reported mild and transient symptoms. The close grouping of the dates of onset in a disease with a relatively short incubation period strongly suggests that all exposures took place within a very limited period of time. The lag in making examinations and bringing cases and carriers under control is clearly evident in the table.

Distribution.—The hospital populations, shown in the first column of table 7, were determined from available records. The individuals examined included not only those present on the census day, June 20, but also those who entered the service subsequently. Thus members of the house staff who began their service on July 1 were cultured as well as those present earlier. The findings lack comparability in one

respect, that is, the nurses and the food handlers were examined first, while the other staff and employee groups and the hospital patients were not examined until the early days of July. At this time the positive findings among the nurses were decreasing. Despite this known difference in the time of stool examination the findings appear definitely to have localized the outbreak to the nurses' residence. All cases were among those who regularly ate food prepared in the nurses' kitchen; of the 23 carriers of the Newcastle organism only 3 were regularly served from other sources and one of them was clearly a contact infection.

TABLE 6.—*Chronological relationships in the outbreak*

Date	Clinical cases			Carriers	
	Onset	Admission to hospital	First stool culture	First stool culture	Isolated
June 20	1	0	0	0	0
21	12	0	0	0	0
22	43	9	0	0	0
23	26	43	16	0	0
24	6	10	17	0	0
25	7	9	3	0	0
26	2	8	7	0	0
27	0	2	3	4	0
28	0	0	20	9	0
29	0	2	22	6	0
30	0	9	3	2	4
July 1	0	1	1	1	6
2	0	3	3	0	3
3	0	0	2	0	6
4	0	0	0	0	1
5	0	0	0	1	1
6	0	0	0	0	0
7	0	1	0	0	1
Total	97	97	97	23	[1] 22

[1] 1 carrier was never isolated in the hospital.

The suspected cases considered in the last column of table 7 were, with few exceptions, individuals kept under observation on the basis of the isolation of an organism which gave a positive reaction on Russell's medium. They were released when specific Newcastle antiserum failed to agglutinate the organism. Most of these proved to be *Shigella alkalescens*. A few persons were isolated and observed for a diarrheal disorder which in most instances had its onset during or shortly after the Fourth of July holiday. The general distribution of these suspected cases is in striking contrast to the close grouping of the Newcastle infections.

In addition to the nursing group which was chiefly involved there were cases and carriers among the dietitians and anesthetists who lived and ate in the nurses' home. The nurse aides came to the nurses' home for meals only; 3 of the 40 were infected. Among the kitchen staff no cases or carriers were found, except the dietitian who ate her meals in the supervisors' dining room. An elevator operator who worked and ate in the nurses' residence became ill.

A group of 28 maids and porters worked in the nurses' quarters but obtained meals in the main employees' cafeteria. None of these persons became ill. Among the 25 examined, with the average of two tests per person, no carrier was found.

TABLE 7.—*Distribution of infection among groups obtaining food from different sources*

Source of food	Patients and staff as of June 20, 1939	Individuals examined	Positive for "Newcastle"		Clinical cases negative bacteriologically	Total infected	Attack rate, percent	Suspected cases	
			Cases	Carriers				Number	Attack rate, percent[1]
A. Main kitchen:									
Patients, semiprivate and ward	474	142	0	0	0	0	0	12	8.5
Officers	30	0	0	0	0	0	0	0	0
House staff	65	73	0	0	0	0	0	3	4.1
Social workers	61	11	0	0	0	0	0	2	18.2
Clerks	145	49	0	0	0	0	0	2	4.1
Employees' cafeteria	290	190	0	1	0	1	.5	8	4.2
B. Private pavilion:									
Patients	103	20	0	0	0	0	0	0	0
Nurses	165	178	0	0	0	0	0	11	6.2
Kitchen help	20	23	0	2	0	2	8.7	2	9.5
C. Children's kitchen	63	0	0	0	0	0	0	0	0
D. Nurses' residence:									
Supervisors	28	29	3	2	0	5	17.2	1	4.2
Head nurses	83	85	5	2	1	8	9.4	5	6.5
Cafeteria	364	340	67	14	19	100	29.4	14	5.8
Help and nurse aides	88	84	2	2	0	4	4.8	3	3.8
E. Outside hospital and unidentified by occupation	--------	224	0	0	0	0	0	3	1.3
Total	1,979	1,448	77	23	20	120	8.3	66	5.0

[1] Computed on basis of number examined exclusive of known cases or carriers.

Three carriers of the Newcastle bacillus had no known contacts with the nurses' residence. Two were employed in the private pavilion as cook and dishwasher, respectively. The third worked in the laundry and received her meals from the main kitchen. She was admitted to the isolation ward as a suspected positive. The first organism isolated in her case was subsequently found to be *Shigella alkalescens*. After four more stool examinations which were negative for Newcastle she then had one positive. As she had been placed in a ward with known infected cases, this was assumed to be a secondary contact infection.

Possible modes of dissemination.—Certain possible channels of dissemination could be eliminated. There was no common social event which included those infected. No evidence could be found to incriminate water. Those who ate elsewhere but worked in the nurses' home and drank the water there did not become infected. Moreover, examination of the water supply revealed no evidence of a source of pollution which would remain limited to one part of the institution. The ice used for all purposes was manufactured in the hospital and was distributed to all divisions. Likewise the food as purchased could

scarcely be suspected since it was distributed to all the kitchens and similar menus were used throughout. Therefore, it seemed evident that if the disease was spread by food, the food must have been contaminated while it was being prepared in the kitchen of the nurses' home.

TABLE 8.—*Attendance at meals in the nurses' dining rooms during the days of possible spread of the infection*

Day, date, and meal	Cases			Carriers			Controls		
	Records obtained	Meals in		Records obtained	Meals in		Records obtained	Meals in	
		Number	Percent		Number	Percent		Number	Percent
Thursday, June 15:									
Breakfast	67	48	72	13	9	69			
Dinner [1]	67	65	97	13	9	69			
Supper	67	57	85	13	8	62			
Friday, June 16:									
Breakfast	67	49	73	13	10	77			
Dinner [1]	67	64	95	13	9	69			
Supper	67	58	87	13	8	62			
Saturday, June 17:									
Breakfast	67	47	70	13	10	77			
Dinner [1]	67	63	94	13	9	69			
Supper	67	52	78	13	6	46			
Sunday, June 18:									
Breakfast	67	34	51	13	10	77			
Dinner [1]	67	51	76	13	6	46			
Supper	67	37	55	13	6	46			
Monday, June 19:									
Breakfast	93	74	80	17	13	76	213	151	71
Dinner [1]	93	91	98	17	11	65	213	187	88
Supper	93	80	86	17	8	47	213	154	72
Tuesday, June 20:									
Breakfast	93	75	81	17	12	71	213	149	70
Dinner [1]	93	92	99	17	11	65	213	186	87
Supper	93	81	87	17	7	41	213	153	72
Wednesday, June 21:									
Breakfast	93	72	77	17	11	65	213	151	71
Dinner [1]	93	86	91	17	9	53	213	183	86
Supper	93	72	77	17	6	35	213	149	70

[1] Includes those served the same foods at noon and midnight.

Detailed evidence was collected relative to the possible spread of the infection by foods served in the nurses' residence. A preliminary survey indicated that several individuals who later became ill were absent from meals on Sunday, July 18, and one person did not go on duty until Monday, July 19. Information as to meals taken in the hospital from June 15 to 18 was collected from 67 of the nurses who became ill and 13 carriers; however, for the 3 days, Monday, June 19, through Wednesday, June 21, data were obtained from almost all the cases, carriers, and uninfected individuals possibly exposed. The findings are shown in table 8. It is evident that many did not have breakfast in the dining rooms and that absence from the evening meal was relatively common. Therefore, if the infection was spread by food, only that which was served at the midday and midnight meals could be responsible. The same food was prepared in common for these, that for the night meal being heated, when necessary, and served

in individual dishes immediately prior to consumption. This menu alone was used by most of those who became ill. Two of the subsequent cases were absent from dinner on Monday, June 19. Only one individual said that, though she could not recall positively, she believed that she had been out for dinner on Tuesday, June 20. Six ate elsewhere on Wednesday, June 21. Among the carriers, absence from meals was more common, as is shown in the table. It is evident that breakfast or supper could scarcely be incriminated, but food served Tuesday noon or midnight is known to have reached all or all but one of those who developed symptoms, while on Monday two, and on Wednesday six of the subsequent cases were absent.

These meals were suspected early and verbal inquiry was then made as to foods consumed. The detailed data given in table 9 were collected between 10 and 14 days after the meals were eaten. As everyone had given thought to the food possibly responsible, the data are believed to be reasonably reliable. For comparison of food selection a group identical with the cases in number, occupation, and meals consumed was used. The striking finding was the lack of any evidence to incriminate some one food.

TABLE 9.—*Foods selected from the dinner menus by 91 cases and an equal number of controls*

Date	Foods	Number selecting the various foods and beverages	
		Cases	Healthy controls
June 19	Mushroom and barley soup	36	24
	Tomato stuffed with macaroni and cheese	19	23
	Cold roast beef, pickle, and potato chips	58	59
	Peach and nut salad	63	66
	Romaine salad with Russian dressing	9	12
	Cocoanut marshmallow squares	14	19
	Watermelon	66	57
	Milk	15	30
	Iced tea	77	62
	Hot tea	5	4
	Bread and butter	38	54
June 20	Puree split pea	27	24
	Chili con carne	25	21
	Tuna fish salad, relish, and baked potato	63	65
	Orange and cocoanut salad	51	42
	Cucumber salad	33	32
	Chocolate pudding	36	39
	Fresh pineapple	51	46
	Milk	21	29
	Iced tea	72	65
	Hot tea	6	3
	Bread and butter	37	57

In view of the variation of incidence among those served from the same menu in the four dining rooms in the nurses' home, we sought to determine significant variations in the food selection. We did find that the help and nurse aides used salads and iced tea less frequently than the nurses, and meats and milk more commonly. However,

the head nurses and supervisors, who had relatively low case rates, selected foods similar in variety to those used by students and general duty nurses who ate in the cafeteria.

We found only one article of diet which varied in distribution as did the case incidence. This was the salad dressing, which was both mixed with certain of the salads and also available for serving with them. For the latter purpose in the cafeteria the dressing was put on the counter in a big mixing bowl with a large serving spoon. It was difficult to obtain anything but a generous portion and the average volume used per person was known to be relatively large. In contrast, at each of the small tables for the head nurses and supervisors there was a small bowl of salad dressing, and for serving it, a teaspoon. As a result this group tended to use dressing sparingly. The nurse aides and kitchen help rarely ate salads and used little of the dressing. One of the salads is known to have been selected on Tuesday noon by all but six of those who became ill and all or most of these used extra salad dressing. Three lots of the dressing made according to the same recipe, with known minor variations particularly in acidity, were examined. In two of these the organism believed responsible for the outbreak did not multiply, but in one the Newcastle organism grew freely.

The cases tend to conform to the picture of an explosive food-borne infection, but the carriers cannot all be so explained. The evidence indicates that two carriers acquired their infection by direct contact, a special nurse who entered duty June 23 to care for the sick students and the laundress above mentioned. It is suspected that through the close contacts in the nurses' and employees' dormitories, others may have been similarly infected. In this manner the two carriers in the private pavilion may be explained.

The delay in the initiation of the laboratory examinations diminished the reliability of the bacteriological search for the carrier who probably had contaminated the food. These examinations were conducted chiefly during the second week after the infection is believed to have been disseminated. Any mild case or an asymptomatic carrier would have had an adequate opportunity to become negative before being examined. The dietitian serving in the nurses' home and also eating there was found to be a carrier and did have an agglutination titer of 1:40 which was above that of most of the other carriers. This is the only evidence to suggest that she may have harbored the organisms longer than the 8 days from the date of probable spread of the infection to her first and only positive culture. If this is so there is a remote possibility that she might have contaminated the food.

COMMENT

From a study of isolated endemic infections it is difficult to prove the pathogenicity of a newly recognized organism. Our observations in this outbreak establish beyond question that the "Newcastle dysentery bacillus" is pathogenic.

The cultural findings in this study have again demonstrated that a bacteriological procedure reasonably satisfactory as a clinical diagnostic test may be inadequate for the collection of reliable epidemiological observations. In clinical disease the infection is likely to be massive but in carrier states the organisms may be present in small numbers only. Under the latter circumstances a large inoculum must be used to discover the suspected agents. Effective epidemiological study of the enteric infections requires the use of some culture medium which will both inhibit the common nonpathogenic enteric organisms, thus permitting the use of a heavy inoculum, and favor the growth of the suspected pathogens. For *Shigella dysenteriae* the desoxycholate citrate agar has been found to be superior to other media previously available. The defect of this preparation is that it does inhibit in varying degrees certain of the pathogens, including the "Newcastle dysentery bacillus." Despite this known imperfection, this selective medium was markedly superior to ordinary nonselective preparations in the detection of carriers. How much different the observations would have been if a better selective medium had been available is a matter of speculation.

In the study of the acute diarrheal disorders particular attention must be given to the healthy persons possibly exposed. In infections due to *Entameba histolytica* the carriers usually outnumber the clinical cases. Carriers of *Shigella dysenteriae* are also relatively frequent but probably often escape detection. It is obvious that the presence of any substantial number of undetected carriers may obscure an epidemiological picture.

SUMMARY

1. An explosive outbreak of 97 cases of bacillary dysentery occurred in a hospital in New York City and involved nurses chiefly.
2. The Newcastle dysentery bacillus was isolated from 79.4 percent of the cases.
3. Twenty-three carriers were found.
4. The constitutional symptoms were more severe than in infections with *Shigella dysenteriae* Flexner and *Shigella dysenteriae* Sonne.
5. The coli-inhibiting medium, desoxycholate citrate agar, was found to be of superior value in the isolation of the organism, particularly from carriers.

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6. The sera of cases and carriers contained agglutinins for the "Newcastle dysentery bacillus" in amounts well above that observed in control sera. Complete agglutination was obtained in a maximum titer of 1:320.

7. The infection was evidently spread by food contaminated by an undetected carrier in the kitchen of the nurses' home.

8. The responsible item of food could not be identified with certainty but the evidence tended to incriminate salad dressing.

9. This outbreak firmly establishes the pathogenicity of this recently described organism.

REFERENCES

(*1*) Hardy, A. V., Watt, J., Kolodny, M., and De Capito, T.: Infections due to the "Newcastle dysentery bacillus," Am. J. Pub. Health, 30:53 (1940).
(*2*) Clayton, F. H. A., and Warren, S. H.: A further study of an unusual bacillus recovered from cases presenting symptoms of dysentery. J. Hygiene, 29:191 (1929).
(*3*) Boyd, J. S. K.: The antigenic structure of the mannitol fermenting group of dysentery bacilli. J. Hygiene, 38:477 (1938).

EXPERIMENTAL PRODUCTION OF AGGLUTININS FOR *TRYPANOSOMA CRUZI*[1]

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Although *Trypanosoma cruzi* infection in man and in animals has been known since 1907 (*1, 10*), up to the beginning of the present study (1933) no one has utilized the culture of *Trypanosoma cruzi* as a means of diagnosing the disease (*7, 8, 10, 11*). Such a study was undertaken by the writer, and a brief summary of the agglutination and precipitation tests for diagnosis of *Tr. cruzi* infection was published during 1935 (*7*). The object of the present paper is to give a detailed description of the technique of the macroscopic agglutination test and the results obtained by such procedure.

Guerreiro and Machado (*2*) in 1913 used the complement fixation test for diagnosing Chagas' disease. They considered their antigen, which consisted of a glycerine and aqueous extract of heart and spleen of infected animals (puppies), as being specific. The complement fixation test for this disease has been used also by others who consider the reaction specific and of diagnostic significance (*3, 4, 9*).

[1] A part of this study was performed at the Department of Bacteriology and Immunology, Washington University Medical School, St. Louis, Mo., during the academic year 1933–34. The writer is indebted to the members of the Department of Bacteriology and Immunology of Washington University for their kind interest in this work.

METHODS AND MATERIALS

Trypanosoma cruzi.—Three strains of *Tr. cruzi* were used during this study. The first strain, No. 1, was derived from infected *Triatoma genticulata* sent from Panama by Dr. H. Clark.[2] One of the infected *Triatoma* was crushed and inoculated into a guinea pig which contracted the disease. From this animal *Tr. cruzi* was cultured (*6*) on Novy and MacNeal's medium (*5*) on July 20, 1932, at the Medical School, University of Michigan, and has been maintained *in vitro* up to the time of writing (May 1940). It grew luxuriantly and colonized. In spite of its being *in vitro* nearly 8 years it still produces infection in susceptible animals. The second strain, No. 8, was cultured by the writer at Washington University Medical School, St. Louis, Mo., during 1933, from an infected *Triatoma protracta* sent by Professor Charles Kofoid from California. The third strain, No. 4, was isolated from *Triatoma megista* at the National Institute of Health. This strain was sent to the writer by the late Dr. C. Chagas who had isolated it originally from a human case in Brazil during 1936.

Preparation of the Tr. cruzi antigen for immunization and agglutination tests.—*Tr. cruzi* was grown from 1 to 3 weeks on blood agar slants at room temperature or at 25° C. Defibrinated rabbit blood was used exclusively for preparing the culture medium. The tubes were all sealed, either with rubber caps, rubber stoppers, or sealing wax. When sufficient growth was obtained, usually the second week after inoculation, several tubes (from 4 to 100, depending upon the requirements of the particular experiment) were selected. The growth on each tube was freed and suspended in Tyrode solution. This was transferred to sterile test tubes or flasks containing glass beads. After shaking, it was transferred to 15 or 50 cc. centrifuge tubes and centrifuged first at low speed for 5 to 10 minutes to remove coarse particles. The supernatant fluid was transferred into other centrifuge tubes and recentrifuged at high speed (about 3,200 r. p. m.) for 1 hour; the supernatant fluid was this time discarded, and the sediment, trypanosomes, resuspended in Tyrode solution. This last process was repeated three or four times. After the centrifugal washing the supernatant fluid was discarded and the washed trypanosomes were resuspended in Tyrode solution. The thickness of the suspension was the same as that of a 48-hour heavy growth of *B. typhosus* in broth. Each cubic centimeter of the suspension contained about two million trypanosomes.

Immunization of animals.—For immunization of rabbits and a rooster, 30 cc. of a heavy suspension of *Tr. cruzi* were prepared as outlined above. The preparation was killed by adding 0.04 percent of

[2] The writer is indebted to Professor William Taliaferro of the University of Chicago for bringing him this material from Panama.

TABLE 1.—*Determination of agglutination titer of anti-Trypanosoma cruzi serum*

Experimental animal	Dilutions and degree of agglutination																	
	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024	1:2048	1:4096	1:8192	1:16384	1:32768	1:65536	1:131,072	1:262,144	1:524,288 1:1,048,576
Rabbit No. 1:																		
(a) Before inoculation	0	0	0	0	0	0	0	0	0	0	0	0	-------	-------	-------	-------	-------	---
(b) Immunization period 43 days. During this period rabbit was inoculated intervenously 7 times with formalinized antigen and 8 times with live suspensions of *Tr. cruzi* (Panama strain No. 1).	+++	+++	±	0	++++	++++	++++	++++	++++	++++	+	0	-------	-------	-------	-------	-------	---
(c) Immunization period 59 days. During this period rabbit was inoculated intravenously 7 times with formalinized antigen and 11 times with living antigen of *Tr. cruzi* (Panama strain No. 1.)	+++	+++	+	+	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	++++	0	
Rabbit No. 2:																		
(a) Before inoculation	±	0	0	0	0	0	0	0	0	0	0	0						
(b) Immunization period 43 days. During this period rabbit was inoculated intraperitoneally 7 times with formalinized antigen and 8 times with living antigen of *Tr. cruzi* (Panama strain No. 1).	+++	+++	±	±	+++	++++	++++	++++	++++	++	0	0						

(c) Immunization period 59 days. During this period rabbit was inoculated intraperitoneally 7 times with formalinized antigen and 11 times with living antigen of *Tr. cruzi* (Panama strain No. 1).	+++	+++	+	+	++++	++++	++++	++++	++++	++++	++++	++	+	+	0	0	0	0 0
Rabbit No. 3:																		
(a) Before inoculation	0	0	0	0	0	0	0	0	0	0	0	0						
(b) Immunization period 24 days. During this period rabbit was inoculated intervenously 9 times with formalinized antigen of *Tr. cruzi* (Brazilian strain No. 6).	0	0	+	+	+++	+++	+++	++++	++++	±	0	0	0	0	0	0	0	0 0
(c) Immunization period 35 days. During this period rabbit was inoculated intervenously 9 times with formalinized antigen and 7 times with live antigen of *Tr. cruzi* (Brazilian strain No. 6).	+++	+++	++	++	++++	++++	++++	++++	++++	++++	+	+	0	0	0	0	0	0 0
Rooster No. 1:																		
(a) Before inoculation	+	+	+	0	0	0	0	0	0	0	0	0						
(b) Immunization period 43 days. During this period the rooster was inoculated intervenously 7 times with formalinized antigen and 8 times with live antigen of *Tr. cruzi* (Panama strain No. 1).	+++	+++	++++	++++	++++	++++	++++	++++	++++	++++	+++	++++	+++	±	0	0	0	0 0
(c) Immunization period 49 days. During this period the rooster was inoculated intervenously 7 times with formalinized antigen and 11 times with live antigen of *Tr. cruzi* (Panama strain No. 1).	+++	++++	++++	++++	++++	++++	++++	++++	++++	++	0	0	0	0	0	0	0	0 0

TABLE 2.—*Agglutination tests of homologous and heterologous sera against monovalent Trypanosoma cruzi antigen (Panama strain)*

Experimental animals		Duration of infection in days	Dilution of serum and degree of agglutination									
Inoculated with	Species		1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1,024	1:2,048
Tr. cruzi, Panama strain	Rabbit No. 7	82	++++	++++	++++	++++	++++	++++	++++	++	±	0
Tr. cruzi, California strain	Rabbit No. 8	82	++++	++++	++++	++++	++++	+++	++	±	0	0
Tr. cruzi, Panama strain	Rabbit No. 9	70	−	±	++	++++	++++	++++	++++	++++	+++	0
Tr. cruzi, California strain	Rabbit No. 10	76	±	++	++++	++++	++++	++++	++	0	0	0
Tr. cruzi, Brazilian strain	Rabbit No. 11	119	-------	-------	++++	++++	++++	++++	++++	++++	+	±
Tr. cruzi, Brazilian strain	Rabbit No. 12	119	-------	-------	+++	+++	+++	+++	++	++	0	0
Tr. cruzi, Panama strain	Guinea pig No. 1	54	+++	+++	++++	++++	++++	++++	++++	++++	0	0
Tr. cruzi, California strain	Guinea pig No. 2	54	+++	+++	+++	++++	++++	++++	++++	+++	0	0
Tr. brucei	Rabbit No. 13	22	++++	+++	+++	++	0	0	0	0	0	0
Tr. hippicum	Rabbit No. 14	80	+++	+++	++	0	0	0	0	0	0	0
Normal serum, negative control	Rabbit No. 15	-------	±	0	0	0	0	0	0	0	0	0
Anti-*Trypanosoma cruzi* serum, positive control, Panama strain	Rabbit No. 1	-------	++++	++++	+	+	++++	++++	++++	++++	++++	++++

formalin. The antigen was tested for sterility by the cultural method and by inoculation into mice. The stock was divided into several tubes, sealed, and kept on ice at 4° C. All animals used were bled and the serum removed for the control agglutination test. The test being negative, they were injected with 1 cc. of *Tr. cruzi* antigen every 2 or 3 days until 7 or 9 injections had been made. One rabbit was injected intraperitoneally, the other 5 rabbits and the rooster intravenously The agglutination titer was determined at various intervals. After the agglutination titer had reached about 1:1,000, the subsequent 18 to 24 inoculations were made once or twice in a week with living *Tr. cruzi* suspensions. The suspensions were made as outlined above but no formalin was added. Serum was obtained from the animals at intervals, and the agglutination titers were determined. (See table 1.)

The positive agglutination reaction was manifested first with macroscopic clumpings or granular appearance of the entire suspension in the test tube which was followed by heavy sedimentation leaving more or less clear, supernatant fluid. The negative tubes remained uniformly turbid throughout the experiment

Agglutination tests.—Serum was diluted with Tyrode solution. Each serological tube contained 0.5 cc. of the diluted serum to which an equal quantity of freshly prepared live *Tr. cruzi* suspension was added. The antigen consisted of washed live *Tr. cruzi* suspended in Tyrode solution. The suspension contained over 2,000,000 trypanosomes per cc. (about the same turbidity as *B. typhosus* antigen). Utmost care was taken to have an even suspension and to eliminate all clumps. Antigen prepared by such a procedure always gives a definite macroscopic agglutination reaction with positive control serum. The proper control tubes were also made. The tubes were shaken and left at room temperature at water bath or at 37° C. for 30 minutes. At the end of this period the reading was made. Readings were also taken after 1 hour and the following day, and in some cases after a week, and no significant change was found in agglutination titer as compared with the first reading. As a rule, these tests were performed under aseptic precautions.

EXPERIMENTAL FINDINGS

The present study demonstrated that all the animals which were experimentally immunized with *Tr. cruzi* produced specific antibodies, and that the agglutination titer gradually increased, in the case of rabbits, in dilution as high as 1:262,144. Table 1 is representative of many preliminary and final agglutination reactions obtained during the progress of this work.

Rabbits Nos. 1 and 2 and the rooster were immunized with the Panama strain of *Tr. cruzi*. Rabbit No. 1, which received all inocula-

tions intravenously, showed a much higher agglutination titer than Rabbit No. 2, which received a similar amount of antigen intraperitoneally. The prozone usually was present in both. In rabbits No. 1 and No. 2 no drop in agglutination titer was ever noted during the period of immunization. A few weeks following discontinuance of antigen inoculations, the agglutination titer was slightly lowered, but by subsequent inoculations with living antigen of *Tr. cruzi* the agglutination titer of the serum was raised to the former level, and in one instance even higher, showing anamnestic reaction. The agglutination titer for rabbit No. 2 increased but never reached the same height as that for rabbit No. 1. (See table 1.)

Both rabbits used for production of *Tr. cruzi* antiserum appeared healthy during and after the experiments, and continually gained weight. At various intervals cultures were made to see if any of the inoculated trypanosomes were surviving in the blood of the animals, but in no case was a positive culture obtained.

The rooster gave the higher agglutination titer during the earlier period of immunization. However, the agglutination titer never exceeded 1:20,000. It is striking to note that after reaching this height, the titer dropped to as low as 1:2,408, while the fowl was repeatedly inoculated once or twice a week. At this stage of falling titer the animal appeared sick, and antigen inoculations were suspended for 3 weeks. At the end of this period further doses of antigen were given to see whether an anamnestic reaction could be produced, but no rise of agglutination titer was obtained. The rooster was very sick and further inoculations were discontinued. This particular fowl developed paralysis and was killed and all the serum was removed. Samples of the blood obtained at various intervals and placed in Novy and MacNeal's (*5*) medium were always sterile for *Tr. cruzi*. Six normal chickens had a very low agglutination titer, never exceeding 1:20, while in chicks 2 days old the titer was 1:2.

Rabbits Nos. 3, 4, 5, and 6 were inoculated intravenously with the Brazilian strain of *Tr. cruzi* (No. 4). The first 9 inoculations each consisted of 1 cc. of formalinized antigen of *Tr. cruzi*, and were given every second day. Six days from the last inoculation, blood serum obtained from these rabbits agglutinated with homologous strain of *Tr. cruzi* in dilution up to 1:1,024. The following 7 inoculations consisted of living antigen of *Tr. cruzi* given during 35 days, from 2 to 7 days apart. The agglutination titer at the end of that period rose to dulution 1:2,048. Because of the uniformity of the agglutination tests in these four rabbits, only the results obtained with rabbit No. 3 are presented in table 1.

Rabbits Nos. 7 to 12 were inoculated directly with living infective cultures of *Tr. cruzi*—2 rabbits with Panama strains, 2 with Cali-

fornia strains, and 2 with Brazilian strains of *Tr. cruzi*. Samples of serums removed from these animals during 30 to 162 days of illness gave positive agglutination reactions with *Tr. cruzi* antiserums (Panama strain); the agglutination titers ranged from 1:256 to 1:1,024.

Similarly, 2 guinea pigs were inoculated with infective cultures of *Tr. cruzi*, one with the Panama strain and the other with the California strain. Trypanosomes were demonstrated in the blood of these animals at various intervals and recultured. The agglutination titer reached about 1:512 during 54 days (see table 2).

One rabbit, No. 13, infected with *Tr. brucei* (nagana), and another rabbit, No. 14, infected with *Tr. hippicum* (murrina), were bled, the first on the twenty-second day of illness and the second after 80 days of illness; serum samples were subjected to agglutination tests, using *Tr. cruzi* as antigen. The highest agglutination titer obtained with these serum samples was 1:32 (see table 2).

SUMMARY

1. *Trypanosoma cruzi* on the medium of Novy and MacNeal grew luxuriantly and formed colonies. From such cultures desired amounts of microorganisms were removed and used for serological and immunological studies.

2. Anti-*cruzi* serum with a titer of over 1:260,000 was obtained in one instance by the injection of rabbits with washed trypanosome cultures. The first 7 injections consisted of formalinized antigen while the subsequent injections (10 to 30) were live suspensions of washed *Tr. cruzi*.

3. *Tr. cruzi* antigen (culture) was agglutinated by the serum samples from animals infected with *Tr. cruzi* in dilutions of 1:256 to 1:1,024, but with the sera of animals infected with nagana or murrina, the maximum titer of agglutination was 1:32.

4. The California strain of *Tr. cruzi* (cultured from *Triatoma protracta*) agglutinated with the anti-trypanosome sera of the Panama strain (cultured from *Triatoma genticulata*) in very high dilutions.

REFERENCES

(*1*) Chagas, C.: Nóva trypanozomiaze humana. Mem. Inst. Oswaldo Cruz, 1: 159 (1909).

(*2*) Guerreiro, C., and Machado, A.: Da reacção de Bordet e Gengou na molestia de Carlos Chagas como elemento diagnostico. Brazil Medico, **23:** 225–226 (1913).

(*3*) Kelser, R. A.: A complement fixation test for Chagas' disease employing an artificial culture antigen. Am. J. Trop. Med., **16:** 405 (1936).

(*4*) Lacorte, J. G.: A reacção do desvio do complemento na molestia de Chagas. Mem. Instit. Oswaldo Cruz, **20:** 197 (1927).

(*5*) Novy, F. G., and MacNeal, W. J.: On the cultivation of *Trypanosoma brucei*. J. Infect. Dis., **1:** 1 (1904).

(*6*) Packchanian, A.: On the cultivation of seven species of trypanosomes *in vitro*. Science, **80:** 407 (1934).

(7) Packchanian, A.: Agglutination and precipitation tests for the diagnosis of *Trypanosoma cruzi* infection (Chagas' disease). J. Immunol., **29:** 84 (1935).
(8) Taliaferro, W. H.: The Immunology of Parasitic Infections. The Century Co., N. Y., 1929.
(9) Villela, E., and Chagas-Bicalho: As pesquisas de laboratorio no diagnostico da molestia de Chagas. Mem. Instit. Oswaldo Cruz, **16:** 13 (1923).
(10) Wenyon, C. M.: Protozoology. Wm. Wood and Company, New York, 1926
(11) Yorke, W.: Chagas' disease. A critical review. Trop. Dis. Bull., **34:** 275 (1937).

HIGHLY VIRULENT STRAINS OF ROCKY MOUNTAIN SPOTTED FEVER VIRUS ISOLATED FROM TICKS (*D. VARIABILIS*) IN GEORGIA [1]

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The presence of typical scrotal lesions, a shorter average incubation period, and a high fatality rate among the guinea pigs inoculated with strains of Rocky Mountain spotted fever virus recovered in western United States has served in the past to distinguish these strains from those isolated in the eastern part of the country. Recently Topping and Dyer (*1*) reported the recovery of a highly virulent strain from a human patient in the East. Their strain regularly exhibited the scrotal lesions, short incubation period, and high fatality associated with the western strains.

We wish to report the recovery of two strains of this infectious agent from ticks (*D. variabilis*) in Georgia.[2] These strains regularly exhibited the scrotal lesions and short incubation period observed in the western strains of Rocky Mountain spotted fever.

In the summer of 1939, one adult male tick (*D. variabilis*) was submitted to this laboratory. It had been removed from a dog whose owner was suffering from a typical attack of Rocky Mountain spotted fever. Later 4 ticks, 2 engorged adult females and 2 adult males (*D. variabilis*), were taken from a neighbor's dog and sent to us for study. Guinea pigs were inoculated intraperitoneally with emulsions of the ticks, and the infectious agent was isolated in each case. Both strains were maintained in serial passage until their identity was established. One was then dropped and the other kept for further study. This latter strain has been maintained by serial passage in guinea pigs in this laboratory to date.

Involvement of the scrotum was noticed in the second group of passage guinea pigs and has been observed in all subsequent passages. This is apparently identical with that observed in animals inoculated with the western strains. It appears a few days after the onset of fever as a diffuse erythema followed by a macular rash which becomes purpuric within 24 hours. There is a slight edema of the cutaneous structures. The lesions may stop at this point or progress to the stage of necrosis and sloughing of the superficial layers of the skin. Healing usually begins before the slough is complete and progresses from both the bottom and sides of the ulcer. Characteristic scarring results.

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[1] From the Typhus Research Laboratory, Albany, Ga., Division of Infectious Diseases, National Institute of Health.

[2] The ticks were submitted by the health commissioner of DeKalb County and the Georgia State Department of Health.

The strains isolated were shown to be Rocky Mountain spotted fever virus by the clinical picture in guinea pigs and by cross immunity tests with both a typical western and eastern strain of Rocky Mountain spotted fever. No cross immunity existed between the Georgia strains and several strains of endemic typhus fever. Histological examination of the brains of several infected guinea pigs was made by Dr. R. D. Lillie, who reported the typical lesions associated with Rocky Mountain spotted fever.

The clinical picture of routine passage animals used in the maintenance of the Bitterroot strain and our tick strain is summarized in table 1.

TABLE 1

Strain	Where isolated	Number of guinea pigs	Average incubation period, days [1]	Scrotal reaction	Fatality	
					Number	Percent
Tick	Georgia	52	3.54	49	30	57
Bitterroot	Montana	22	3.56	22	16	73

[1] In both strains the minimum incubation period was 2 days and the maximum 5 days, with the exception of one animal inoculated with the tick (Georgia) strain This guinea pig showed a rise in temperature on the seventh day after inoculation.

Table 2 is a summary of the clinical findings in 2 groups of 12 male (500-gram) guinea pigs each inoculated on the same day with the designated strain.

TABLE 2

Strain	Where isolated	Number of guinea pigs	Average incubation period, days	Scrotal reaction	Fatality	
					Number	Percent
Tick	Georgia	12	3.75	12	6	50
Bitterroot	Montana	12	3.58	12	10	83

There is no real difference in the results shown in the two tables and they bring out quite clearly the similarity of the two strains. The average incubation period for the two strains is almost identical and only an occasional animal failed to exhibit a definite scrotal reaction. There was a difference in the fatality rate, that of the Bitterroot strain being distinctly higher than that observed in the tick (Georgia) strain.

SUMMARY

Isolation of two strains of Rocky Mountain spotted fever virus from ticks (*D. variabilis*) in Georgia is reported. These strains are compared with the Bitterroot strain from Montana and points of similarity and difference noted.

REFERENCE

(*1*) Topping, Norman H., and Dyer, R. E.: A highly virulent strain of Rocky Mountain spotted fever virus isolated in the eastern United States. Pub. Health Rep., 55: 728 (April 26, 1940).

DISABLING MORBIDITY AMONG INDUSTRIAL WORKERS, SECOND QUARTER AND FIRST HALF OF 1940, WITH A NOTE ON THE OCCURRENCE OF BRONCHITIS, PNEUMONIA, AND APPENDICITIS, 1931–40 [1]

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The data presented in this paper are derived from periodic reports on sickness and nonindustrial injuries causing disability lasting more than one week among approximately 195,000 male members of 26 industrial sick benefit associations, group insurance plans, and company relief departments.

Second quarter and first half of 1940.—Table 1 shows the frequency of disabilities among male industrial workers for the second quarter and first half of 1940. It will be noted that the number of workers exposed shows an increase from about 170,000 in the second quarter of 1939 to almost 195,000 in the corresponding quarter of 1940. This change reflects principally the increase in the number of iron and steel workers. The statement has frequently been made that large increases in the number of exposed workers probably effect increases in the sickness and injury rates (for example, references *2* and *3*), a thought that will be explored in a later report of this series when more data will have become available.

Attention is directed to the favorable frequencies, both for the second quarter and the first half of the year, shown by tuberculosis of the respiratory system and infectious and parasitic diseases. The rates for the second quarters of 1940 and 1939 show sensible increases for bronchitis, acute and chronic, and appendicitis, while the rates for the second halves show increases for the same causes and, in addition, for pneumonia, all forms.

Bronchitis, pneumonia, and appendicitis, 1931–40.—The increases observed for bronchitis, pneumonia, and appendicitis raise the question of their frequency during preceding years. Table 2 presents the frequencies for the first halves of the years 1931–40; each frequency is also expressed in terms of its relation to the corresponding rate for the entire period of 10 first-half years.

It is seen from the table that: (1) The trends of the frequencies over the 10-year period are upward and increase at approximately the same rate; (2) from 1931 through 1935 the frequencies are in general less than, and after 1935 greater than, the corresponding frequencies for the 10 years; (3) the greatest excess was shown in the first half of 1940; and (4) the largest defect occurred during the first half of 1933. Furthermore, a graphic presentation of the time changes in the fre-

[1] From the Division of Industrial Hygiene, National Institute of Health. For the first quarter of 1940 see reference (*1*).

TABLE 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among MALE employees in various industries, by cause, the second quarter of 1940 compared with the second quarter of 1939, and the first half of 1940 compared with the first halves of the years 1935–39, inclusive* [1]

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of cases per 1,000 males				
	Second quarter		First half		
	1940	1939	1940	1939	1935-39
Sickness and nonindustrial injuries [2]	86.3	83.7	110.7	104.4	101.3
Nonindustrial injuries (163–198)	10.2	9.7	11.4	9.7	10.4
Sickness [2]	76.1	74.0	99.3	94.7	90.9
Respiratory diseases	30.8	30.1	50.5	47.8	43.3
Influenza and grippe (33)	12.0	13.1	25.8	26.4	22.8
Bronchitis, acute and chronic (106)	4.1	3.3	6.4	4.9	5.1
Diseases of the pharynx and tonsils (part of 115)	5.7	5.4	6.0	5.5	5.6
Pneumonia, all forms (107–109)	3.5	3.3	4.9	4.0	3.3
Tuberculosis of the respiratory system (13)	.6	.9	.6	.9	.9
Other respiratory diseases (104, 105, 110–114)	4.9	4.1	6.8	6.1	5.6
Nonrespiratory diseases	43.6	41.9	46.8	44.6	45.1
Digestive diseases	14.4	13.4	14.9	13.8	13.6
Diseases of the stomach except cancer (117, 118)	3.7	3.8	3.9	3.7	3.8
Diarrhea and enteritis (120)	1.3	1.0	1.3	1.1	1.0
Appendicitis (121)	5.1	4.0	5.3	4.2	4.3
Hernia (part of 122)	1.7	1.8	1.6	1.6	1.7
Other digestive diseases (part of 115, 116, part of 122, 123–129)	2.6	2.8	2.8	3.2	2.8
Nondigestive diseases	29.2	28.5	31.9	30.8	31.5
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.1	4.3	4.6	4.8	4.3
Other genitourinary diseases (133–138)	2.4	2.1	2.7	2.2	2.4
Neuralgia, neuritis, sciatica (part of 87)	2.6	2.0	2.8	2.2	2.4
Neurasthenia and the like (part of 84)	1.1	1.0	1.1	1.0	1.1
Other diseases of the nervous system (80–83, part of 84, 85, 86, part of 87)	1.0	1.0	1.1	1.0	1.2
Rheumatism, acute and chronic (58, 59)	4.3	3.8	4.4	4.2	4.4
Diseases of the organs of locomotion, except diseases of the joints (part of 156)	2.7	2.3	3.0	2.7	2.9
Diseases of the skin (151–153)	2.1	2.3	2.6	2.5	2.6
Infectious and parasitic diseases [3] (1–12, 14–24, 26–29, 31, 32, 34–44)	1.9	2.3	2.1	2.6	3.1
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, part of 156, 157, 162)	7.0	7.4	7.5	7.6	7.1
Ill-defined and unknown causes (200)	1.7	2.0	2.0	2.3	2.5
Average number of males covered in the record	194,892	171,144	195,604	170,896	162,164
Number of organizations	26	26	26	26	

[1] In 1940 and 1939 the same organizations are included; the rates for the years 1935–39, however, are based on records from the same 26 organizations and some additional reporting organizations.
[2] Exclusive of disability from the venereal diseases and a few numerically unimportant causes of disability.
[3] Except influenza, respiratory tuberculosis, and the venereal diseases.

quencies of the three causes reveals the least variability for appendicitis, and approximately the same variability for each of the other two causes. Moreover the frequencies for pneumonia are consistently lower than those for either bronchitis or appendicitis, bronchitis being higher than appendicitis for all halves with the exception of those for 1933 and 1934.

The frequencies of bronchitis, pneumonia, and appendicitis have also been examined for the second quarters of the same decade. It was found that bronchitis failed to show its highest second-quarter frequency in 1940, but the occurrence of pneumonia and appendicitis, respectively, was sufficiently high in the second quarter of 1940 to yield the maximum second-quarter frequency of the 10-year period for each disease. Table 3 presents the pertinent data on pneumonia and

appendicitis. Since it is well known that iron and steel workers suffer a relatively high pneumonia rate, the workers reported upon have been appropriately classified as shown in the table. It will be noted that the behavior of pneumonia (all industries) and appendicitis is similar to that shown for the same causes in table 2 covering the first halves of these years. With regard to the pneumonia rate for the iron and steel workers, it will be observed that for each year it is consistently higher than the rate for those not employed in the iron and steel industry; at the same time it appears that the time trend of the rates rises more rapidly for workers not employed in the iron and steel industry.

TABLE 2.—*Frequency of disabling cases of bronchitis, pneumonia, and appendicitis lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, the first halves of 1931–40, inclusive*

Year in first half of which onset of disability occurred	Bronchitis, acute and chronic		Pneumonia, all forms		Appendicitis	
	Annual number of cases per 1,000 males	Ratio to rate for 1931–40	Annual number of cases per 1,000 males	Ratio to rate for 1931–40	Annual number of cases per 1,000 males	Ratio to rate for 1931–40
1931	4.5	0.94	3.1	0.97	3.7	0.90
1932	4.8	1.00	2.3	.72	3.7	.90
1933	2.8	.58	2.1	.66	3.1	.76
1934	3.6	.75	2.4	.75	4.0	.98
1935	4.2	.88	3.0	.94	3.8	.93
1936	6.1	1.27	3.8	1.19	4.3	1.05
1937	5.7	1.19	3.5	1.09	4.6	1.12
1938	4.7	.98	2.5	.78	4.3	1.05
1939	4.9	1.02	4.0	1.25	4.2	1.02
1940	6.4	1.33	4.9	1.53	5.3	1.29
Mean, 1931–40	4.8	1.00	3.2	1.00	4.1	1.00

TABLE 3.—*Frequency of disabling cases of pneumonia and appendicitis lasting 8 consecutive calendar days or longer among MALE employees in various industries, the second quarters of 1931–40, inclusive*

Year in second quarter of which onset of disability occurred	Pneumonia, all forms						Appendicitis	
	Annual number of cases per 1,000 males			Ratio to rate for 1931–40			Annual number of cases per 1,000 males	Ratio to rate for 1931–40
	Iron and steel workers only	All except iron and steel workers	All workers	Iron and steel workers only	All except iron and steel workers	All workers	All workers	All workers
1931	2.7	1.6	2.1	1.00	0.80	0.88	3.5	0.83
1932	1.9	1.6	1.8	.70	.80	.75	4.1	.98
1933	1.9	1.3	1.5	.70	.65	.62	3.2	.76
1934	2.8	1.3	1.9	1.04	.65	.79	4.1	.98
1935	2.3	2.1	2.2	.85	1.05	.92	4.1	.98
1936	3.2	2.2	2.7	1.19	1.10	1.12	4.6	1.10
1937	3.4	1.9	2.7	1.26	.95	1.12	4.7	1.12
1938	1.9	1.8	1.8	.70	.90	.75	4.2	1.00
1939	3.4	3.1	3.3	1.26	1.55	1.38	4.0	.95
1940	3.8	3.0	3.5	1.41	1.50	1.46	5.1	1.21
Mean, 1931–40	2.7	2.0	2.4	1.00	1.00	1.00	4.2	1.00

REFERENCES

(1) Gafafer, W. M.: Disabling morbidity among male and female industrial workers during 1938 and 1939, and among males during the first quarter of 1940, with an inquiry into the occurrence of multiple attacks of disabling sickness and injuries, 1939. Pub. Health Rep., **55**:1402–1406 (August 2, 1940).
(2) U. S. Department of Labor, Bureau of Labor Statistics: Hours, fatigue and health in British munition factories. Bull. No. 221. (Reprints of the memoranda of the British Health of Munition Workers Committee.) United States Government Printing Office (1917). P. 64.
(3) [Gafafer, W. M.]: Sickness among male industrial employees during the third quarter and the first 9 months of 1937. Pub. Health Rep., **53**:37–39 (January 14, 1938). P. 39.

COURT DECISION ON PUBLIC HEALTH

Furnishing of certain articles and services by State board of health to practitioners of the healing art.—(Florida Supreme Court; *State ex rel. Turner* v. *Baltzell et al.*, 197 So.783; decided September 20, 1940.) The State Board of Health of Florida, by rule, provided for the furnishing of specimen containers, biological products, and laboratory services to doctors of medicine, osteopaths, and dental surgeons only, but denied them to doctors of naturopathy. In a proceeding by a duly licensed naturopath there was called into question the discrimination that the rule worked against naturopaths. The supreme court pointed out that naturopathic treatment was authorized in Florida by statute and took the view that naturopaths could not be discriminated against in the manner shown.

DEATHS DURING WEEK ENDED NOVEMBER 2, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 2, 1940	Corresponding week, 1939
Data from 87 large cities of the United States:		
Total deaths	7,886	7,684
Average for 3 prior years	7,080	
Total deaths, first 44 weeks of year	365,007	358,751
Deaths under 1 year of age	570	436
Average for 3 prior years	469	
Deaths under 1 year of age, first 44 weeks of year	21,808	21,671
Data from industrial insurance companies:		
Policies in force	64,821,760	66,594,573
Number of death claims	10,433	11,775
Death claims per 1,000 policies in force, annual rate	8.4	9.2
Death claims per 1,000 policies, first 44 weeks of year, annual rate	9.6	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 9, 1940

Summary

For the current week, increased incidence was recorded for diphtheria, measles, and scarlet fever, as compared with the preceding week, while the incidence of measles, poliomyelitis, and whooping cough was considerably above the 5-year (1935–39) median expectancy as well as above last year's figures for the corresponding week. Poliomyelitis, although continuing its seasonal decline, is still 79 percent above the 5-year median, measles is 73 percent above, and whooping cough is about 29 percent above. For 1940 to date, however, the cumulative figures are above the 5-year cumulative medians for only influenza and poliomyelitis.

The incidence of influenza decreased in the two States which reported the largest numbers of cases last week (South Carolina from 331 to 144, and Texas from 271 to 220), and the number of poliomyelitis cases dropped from 330 to 278, with the North Central States still reporting the highest incidence.

Of 44 cases of endemic typhus fever, Georgia and Texas each reported 12, Florida 6, and Alabama 5.

For the current week the Bureau of the Census reports 7,984 deaths in 88 major cities of the United States, as compared with 7,967 for the preceding week and with a 3-year (1937–39) average of 7,745 for the corresponding week.

269971°—40——3

Telegraphic morbidity reports from State health officers for the week ended November 9, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11 1939		Nov. 9, 1940	Nov. 11, 1939	
NEW ENG.												
Maine	1	1	2	3	-------	-------	106	21	21	0	0	0
New Hampshire	0	0	0	-------	-------	-------	0	4	3	0	0	0
Vermont	0	0	0	-------	-------	-------	3	48	21	0	0	0
Massachusetts	2	7	2	-------	-------	-------	227	105	82	2	1	0
Rhode Island	0	0	0	-------	-------	-------	0	34	4	0	0	0
Connecticut	0	0	3	3	3	3	4	6	23	0	1	0
MID. ATL.												
New York	14	15	22	[1] 6	[1] 7	[1] 8	262	171	139	1	4	6
New Jersey	6	23	16	-------	4	6	112	8	12	2	1	1
Pennsylvania	15	27	39	-------	-------	-------	518	31	60	2	4	4
E. NO. CEN.												
Ohio	11	68	68	16	5	5	30	8	14	0	0	2
Indiana	18	15	31	2	6	12	7	7	9	1	0	1
Illinois	34	18	46	1	11	11	218	14	14	0	0	3
Michigan [2]	10	12	15	3	1	1	330	100	41	1	2	1
Wisconsin	1	1	4	21	30	36	285	27	52	1	1	0
W. NO. CEN.												
Minnesota	1	1	12	4	1	-------	45	31	31	1	1	0
Iowa	1	19	16	1	-------	1	31	6	6	1	0	0
Missouri	10	11	21	-------	1	36	26	1	9	0	0	2
North Dakota	7	3	1	1	4	-------	0	6	6	0	0	0
South Dakota	3	2	1	-------	3	-------	2	4	1	0	2	1
Nebraska	0	1	2	-------	1	-------	5	1	1	0	0	0
Kansas	2	2	12	4	6	2	8	35	4	0	0	0
SO. ATL.												
Delaware	0	0	0	-------	-------	-------	1	0	3	0	0	0
Maryland [2]	16	7	13	3	4	6	3	3	7	0	0	2
Dist. of Col.	2	4	7	-------	2	2	0	0	2	0	1	1
Virginia [3]	25	90	81	74	114	-------	23	7	8	2	2	2
West Virginia [2]	12	17	23	2	12	14	7	8	10	0	3	1
North Carolina [3]	58	141	105	4	2	4	6	74	74	2	0	1
South Carolina [3]	11	23	21	144	239	220	9	5	5	0	2	0
Georgia [3]	13	46	44	31	175	-------	4	5	0	0	0	0
Florida [3]	4	6	12	1	2	2	1	4	4	0	0	0
E. SO. CEN.												
Kentucky	8	18	38	7	4	6	51	2	25	3	1	1
Tennessee	14	45	43	25	28	28	30	7	7	1	2	2
Alabama [3]	13	36	37	27	59	59	14	8	1	3	0	2
Mississippi [2]	17	13	24	-------	-------	-------	-------	-------	-------	0	1	1
W. SO. CEN.												
Arkansas	15	35	24	17	16	17	5	1	3	0	1	0
Louisiana [3]	12	13	21	2	11	13	1	0	2	0	3	1
Oklahoma [4]	19	12	12	33	53	25	1	0	3	0	1	1
Texas [3]	28	57	65	220	200	147	38	29	19	1	5	1
MOUNTAIN												
Montana	7	0	0	1	14	5	1	8	8	0	0	0
Idaho	1	0	0	-------	-------	3	1	5	17	0	1	0
Wyoming	0	1	1	-------	-------	-------	3	15	5	0	0	0
Colorado	3	7	8	7	28	-------	20	13	2	0	0	0
New Mexico	0	5	5	1	-------	2	19	0	4	0	0	0
Arizona	5	1	2	84	46	43	23	1	2	0	0	0
Utah [2]	0	1	1	15	3	-------	2	23	23	0	0	0
Nevada	1	-------	-------	-------	-------	-------	0	-------	-------	0	-------	-------
PACIFIC												
Washington	1	7	4	2	1	1	4	209	24	0	1	0
Oregon	4	0	1	-------	7	18	10	11	11	0	0	0
California [3]	16	23	33	22	12	27	21	111	111	1	1	2
Total	441	836	941	787	1,115	887	2,517	1,277	1,454	25	41	67

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 9, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939		Nov. 9, 1940	Nov. 11, 1939	
NEW ENG.												
Maine	1	0	0	10	4	13	0	0	0	2	1	1
New Hampshire	1	0	0	15	2	2	0	0	0	0	0	0
Vermont	0	1	0	5	1	4	0	0	0	0	1	0
Massachusetts	1	2	2	95	46	123	0	0	0	0	0	3
Rhode Island	0	0	0	6	8	8	0	0	0	0	1	0
Connecticut	0	0	0	15	22	32	0	0	0	0	0	1
MID. ATL.												
New York	7	23	6	173	135	266	0	0	0	9	16	13
New Jersey	5	5	3	80	62	54	0	0	0	0	3	3
Pennsylvania	6	13	4	120	242	242	0	0	0	8	14	14
E. NO. CEN.												
Ohio	23	5	2	124	205	251	0	0	0	4	5	9
Indiana	24	2	2	109	121	121	0	1	3	4	8	3
Illinois	28	2	4	213	248	274	3	0	1	6	7	12
Michigan [2]	30	6	4	140	242	242	0	15	1	1	1	3
Wisconsin	23	5	1	93	116	145	2	3	3	2	0	2
W. NO. CEN.												
Minnesota	12	8	1	66	85	94	0	2	2	0	3	0
Iowa	12	23	3	50	78	78	1	6	6	1	0	3
Missouri	18	1	2	67	39	86	1	0	2	7	2	5
North Dakota	0	0	0	7	24	40	0	0	1	0	1	1
South Dakota	3	4	1	28	32	31	0	1	1	3	1	1
Nebraska	6	0	0	10	15	15	1	1	1	0	0	0
Kansas	7	3	3	58	101	101	0	1	2	3	4	4
SO. ATL.												
Delaware	0	0	0	4	16	10	0	0	0	0	0	0
Maryland [2]	0	0	0	32	35	66	0	0	0	0	4	4
Dist. of Col.	0	0	0	6	14	9	0	0	0	0	4	1
Virginia [3]	13	1	1	36	56	56	0	0	0	12	5	10
West Virginia [2]	13	4	2	81	89	89	0	0	0	3	11	7
North Carolina [3]	1	3	1	131	96	90	0	0	0	2	4	4
South Carolina [3]	0	4	0	21	20	12	0	0	0	0	6	3
Georgia [3]	1	2	2	32	40	30	0	0	0	7	3	4
Florida [3]	1	2	1	1	8	6	0	0	0	5	2	0
E. SO. CEN.												
Kentucky	7	13	1	72	74	84	0	0	0	9	1	8
Tennessee	1	0	0	92	100	71	0	0	0	7	7	8
Alabama [3]	1	1	1	24	47	29	0	0	0	4	4	4
Mississippi [2]	2	0	2	12	14	19	0	0	0	1	4	5
W. SO. CEN.												
Arkansas	1	1	1	9	11	11	1	0	1	5	10	7
Louisiana [3]	7	1	1	11	23	17	1	2	1	7	3	8
Oklahoma [4]	1	2	1	14	14	15	1	1	1	8	8	15
Texas [3]	4	4	4	32	39	71	3	0	1	16	13	22
MOUNTAIN												
Montana	0	0	0	26	33	37	0	0	5	1	0	2
Idaho	4	2	0	19	12	33	0	0	0	2	1	2
Wyoming	2	0	0	7	6	6	0	0	1	0	0	0
Colorado	0	3	0	39	32	41	0	3	3	2	3	1
New Mexico	0	3	0	6	8	15	0	0	0	5	0	8
Arizona	0	0	0	10	1	6	0	0	0	1	0	1
Utah [2]	3	5	0	17	25	25	0	0	0	1	0	0
Nevada	0	------	------	0	------	------	0	------	------	0	------	------
PACIFIC												
Washington	11	1	2	16	71	45	1	0	1	3	4	4
Oregon	0	1	1	15	13	32	3	0	1	0	1	2
California [3]	2	22	11	89	116	180	0	0	1	3	30	14
Total	282	178	155	2,288	2,841	3,207	18	36	79	154	196	270
45 weeks	8,995	6,630	6,630	135,828	136,566	191,424	2,132	9,001	9,001	8,735	11,726	13,124

See footnotes at end of table.

Telegrapic morbidity reports from State health officers for the week ended November 9, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended— Nov. 9, 1940	Nov. 11, 1939	Division and State	Whooping cough, Week ended— Nov. 9, 1940	Nov. 11, 1939
NEW ENG.			SO. ATL.—continued		
Maine	43	44	Georgia [3]	9	8
New Hampshire	1	0	Florida [3]	5	10
Vermont	27	71			
Massachusetts	185	138	E. SO. CEN.		
Rhode Island	4	21			
Connecticut	94	72	Kentucky	59	79
			Tennessee	70	65
MID. ATL.			Alabama [3]	5	12
			Mississippi [2]		
New York	450	300			
New Jersey	137	89	W. SO. CEN.		
Pennsylvania	541	279			
			Arkansas	22	12
E. NO. CEN.			Louisiana [3]	6	18
Ohio	213	38	Oklahoma [4]	16	2
Indiana	13	37	Texas [3]	89	45
Illinois	155	161			
Michigan [2]	256	102	MOUNTAIN		
Wisconsin	195	132			
			Montana	0	4
W. NO. CEN.			Idaho	5	0
Minnesota	86	57	Wyoming	4	7
Iowa	27	16	Colorado	17	9
Missouri	79	11	New Mexico	7	27
North Dakota	16	4	Arizona	9	1
South Dakota	5	6	Utah [2]	27	107
Nebraska	8	7	Nevada	0	
Kansas	57	12			
SO. ATL.			PACIFIC		
Delaware	26	10	Washington	37	19
Maryland [2]	90	52	Oregon	12	19
District of Columbia	14	7	California [3]	265	57
Virginia [3]	30	59			
West Virginia [1]	29	10	Total	3,591	2,321
North Carolina [3]	134	76			
South Carolina [3]	12	9	45 weeks	142,679	154,703

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Nov. 9, 1940, 44 cases as follows: Virginia, 2; North Carolina, 1; South Carolina, 3; Georgia, 12; Florida, 6; Alabama, 5; Louisiana, 2; Texas, 12; California, 1.
[4] Rocky Mountain spotted fever, week ended Nov. 9, 1940, Oklahoma, 1 case.

VENEREAL DISEASES

New Cases Reported for August 1940 [1]

Reports from States

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis [2]					
	Primary and secondary	Early latent [3]	Rate per 10,000 population	Includes late latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Alabama	214	319	1.82	310	1.06	94	0.32	1,320	4.51	545	1.86	16	0.05
Alaska [4]	------	------	------	------	------	------	------	------	------	------	------	----	------
Arizona	26	13	.93	33	.79	9	.22	199	4.76	210	5.02	3	.07
Arkansas	284	294	2.79	489	2.36	40	.19	1,255	6.05	138	.67	13	.06
California	130	348	.76	1,056	1.69	57	.09	1,684	2.69	1,760	2.81	32	.05
Colorado	42	------	.39	110	1.02	16	.15	168	1.56	65	.60	----	------
Connecticut	17	11	.16	75	.43	18	.10	154	.88	106	.61	1	.01
Delaware	16	16	1.22	40	1.52	3	.11	182	6.92	52	1.98	----	------
District of Columbia	------	------	------	------	------	------	------	361	5.68	277	4.36	4	.06
Florida	266	334	3.53	710	4.18	58	.34	1,797	10.58	150	.88	10	.06
Georgia	------	1,455	4.67	644	2.07	------	------	2,099	6.74	78	.25	1	.003
Hawaii [4]	------	------	------	------	------	------	------	------	------	------	------	----	------
Idaho	16	------	.32	17	.34	2	.04	38	.76	19	.38	----	------
Illinois	106	353	.58	1,276	1.61	80	.10	1,815	2.29	1,673	2.11	29	.04
Indiana	65	54	.34	207	.59	39	.11	511	1.46	139	.40	2	.01
Iowa	43	64	.42	76	.30	8	.03	204	.80	150	.59	----	------
Kansas	45	35	.43	44	.24	14	.08	194	1.04	113	.61	----	------
Kentucky	103	44	.50	259	.88	8	.03	663	2.24	407	1.38	1	.003
Louisiana	205	3	.97	3	.01	------	------	897	4.18	77	.36	10	.05
Maine	15	------	.17	15	.17	3	.03	33	.38	34	.40	----	------
Maryland	112	42	.91	198	1.18	23	.14	844	5.01	400	2.37	24	.14
Massachusetts	45	------	.10	239	.54	13	.03	297	.67	366	.83	----	------
Michigan	75	111	.38	287	.59	40	.08	671	1.37	628	1.29	15	.03
Minnesota	28	20	.18	202	.76	13	.05	266	1.00	259	.97	1	.004
Mississippi	229	730	4.70	876	4.29	111	.54	4,703	23.05	2,516	12.33	----	------
Missouri	166	369	1.33	273	.68	19	.05	881	2.19	347	.86	5	.01
Montana	10	------	.18	19	.35	2	.04	35	.64	30	.55	----	------
Nebraska	15	5	.15	32	.23	3	.02	55	.40	36	.26	----	------
Nevada	------	5	.49	21	2.06	------	------	26	2.55	15	1.47	----	------
New Hampshire	1	1	.04	5	.10	------	------	16	.31	5	.10	----	------
New Jersey	106	137	.56	433	.99	45	.10	786	1.80	300	.69	2	.005
New Mexico	20	12	.76	63	1.49	6	.14	102	2.42	57	1.35	----	------
New York	360	470	.64	2,768	2.13	165	.13	3,991	3.07	2,172	1.67	85	.07
North Carolina	237	750	2.80	578	1.04	107	.30	1,672	4.74	173	.49	8	.02
North Dakota	6	3	.13	6	.08	2	.03	32	.45	23	.32	----	------
Ohio	193	228	.62	829	1.23	72	.11	1,322	1.96	153	.23	4	.01
Oklahoma	136	143	1.09	226	.88	29	.11	811	3.16	530	2.06	3	.01
Oregon	37	28	.63	72	.69	3	.03	142	1.37	160	1.54	----	------
Pennsylvania	221	518	.72	707	.69	77	.08	1,561	1.53	------	------	----	------
Rhode Island	12	12	.35	96	1.41	5	.07	131	1.92	67	.98	----	------
South Carolina	513	374	4.69	595	3.14	48	.25	1,561	8.25	57	.30	----	------
South Dakota	10	1	.16	6	.09	1	.01	18	.26	16	.23	----	------
Tennessee	276	483	2.60	723	2.47	174	.60	1,663	5.69	371	1.27	9	.03
Texas [4]	------	------	------	------	------	------	------	------	------	------	------	----	------
Utah	7	5	.23	42	.80	5	.10	62	1.19	16	.31	1	.02
Vermont	2	7	.23	1	.03	2	.05	12	.31	19	.49	----	------
Virginia	370	373	2.71	716	2.61	57	.21	1,652	6.02	283	1.03	----	------
Washington	81	36	.70	165	.99	12	.07	319	1.91	485	2.90	1	.01
West Virginia	100	125	1.18	170	.89	19	.10	704	3.70	285	1.50	----	------
Wisconsin	16	5	.07	122	.41	8	.03	151	.51	124	.42	----	------
Wyoming	4	6	.42	12	.51	1	.04	28	1.18	35	1.48	----	------
Puerto Rico [4]	------	------	------	------	------	------	------	------	------	------	------	----	------
Virgin Islands [4]	------	------	------	------	------	------	------	------	------	------	------	----	------
Total	4,981	8,342	1.08	15,846	1.28	1,511	.12	38,088	3.07	15,921	1.28	280	.03

See footnotes at end of table.

Reports from cities of 200,000 population or over

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis					
	Primary and secondary	Early latent	Rate per 10,000 population	Includes late latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Akron	15	13	1.02	35	1.27	3	0.11	69	2.51	43	1.56	----	----
Atlanta	----	322	10.72	127	4.23	----	----	449	14.95	61	2.03	----	----
Baltimore	96	20	1.39	138	1.65	3	.04	526	6.30	299	3.58	23	0.28
Birmingham	57	15	2.45	26	.88	13	.44	258	8.77	40	1.36	----	----
Boston	10	----	.13	70	.88	5	.06	95	1.19	135	1.70	----	----
Buffalo	21	----	.35	88	1.46	2	.03	111	1.85	57	.95	----	----
Chicago	75	145	.60	716	1.95	33	.09	969	2.64	1,056	2.88	29	.08
Cincinnati [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Cleveland [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Columbus	9	23	1.02	58	1.85	7	.22	97	3.09	17	.54	----	----
Dallas	39	49	2.90	109	3.59	4	.13	201	6.61	174	5.72	12	.39
Dayton	7	13	.90	53	2.39	2	.09	76	3.43	26	1.17	----	----
Denver	24	9	1.10	78	2.59	9	.30	125	4.15	50	1.66	1	.03
Detroit	77	105	1.00	328	1.81	23	.13	533	2.94	481	2.65	29	.16
Houston	43	88	3.66	135	3.77	22	.01	377	10.52	265	7.39	5	.14
Indianapolis	7	1	.21	5	.13	3	.08	98	2.54	29	.75	----	----
Jersey City	7	6	.40	17	.52	2	.06	32	.99	12	.37	----	----
Kansas City [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Los Angeles	----	191	1.26	453	2.98	22	.14	666	4.38	552	3.63	7	.05
Louisville	9	13	.65	121	3.57	----	----	198	5.84	94	2.77	----	----
Memphis [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Milwaukee	11	----	.17	48	.76	1	.02	66	1.05	29	.46	----	----
Minneapolis	6	5	.22	40	.80	1	.02	52	1.04	57	1.14	1	02
Newark	17	148	3.63	----	----	117	2.58	182	4.01	54	1.19	1	.02
New Orleans [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
New York	360	361	.96	1,780	2.38	111	.15	2,820	3.76	1,658	2.21	90	.12
Oakland [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Omaha	5	4	.40	9	.40	----	----	18	.80	13	.58	----	----
Philadelphia	85	243	1.64	294	1.47	18	.09	640	3.19	----	----	----	----
Pittsburgh [4]	----	----	----	----	----	----	----	----	----	----	----	----	----
Portland	9	11	.62	39	1.22	----	----	60	1.87	80	2.50	----	----
Providence	7	5	.46	56	2.16	3	.12	73	2.81	42	1.62	----	----
Rochester	3	----	.09	21	.61	----	----	24	.70	46	1.35	----	----
St. Louis	23	129	1.80	323	3.83	23	.27	502	5.96	224	2.66	5	.06
St. Paul	6	5	.38	27	.94	3	.10	41	1.43	36	1.25	----	----
San Antonio	13	31	1.68	93	3.56	12	.46	161	6.15	79	3.02	1	.04
San Francisco	36	28	.93	125	1.81	5	.07	194	2.82	262	3.80	11	.16
Seattle	18	24	1.08	80	2.07	4	.10	133	3.44	152	3.93	1	.03
Syracuse	1	2	.13	61	2.71	9	.40	73	3.24	10	.44	----	----
Toledo	5	2	.23	52	1.67	4	.13	63	2.03	39	1.25	----	----
Washington	----	----	----	----	----	----	----	361	5.68	277	4.36	4	.06
Total	1,101	2,011	1.12	5,605	2.01	464	.17	10,343	3.63	6,449	2.26	220	.11

[1] Figures preliminary and subject to correction.
[2] Includes "not stated" diagnosis.
[3] Duration of infection under 4 years.
[4] No report for current month.

WEEKLY REPORTS FROM CITIES

City reports for week ended October 26, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Data for 90 cities:											
5-year average	182	79	29	328	442	746	4	324	43	877	-------
Current week [1]	77	58	15	588	289	553	0	273	30	1,243	-------
Maine:											
Portland	0	------	0	0	2	6	0	0	1	2	16
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	10
Manchester	0	------	0	0	2	2	0	0	0	0	24
Nashua	0	------	0	0	0	1	0	0	0	0	10
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	3	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	0	------	0	28	6	15	0	8	0	73	218
Fall River	1	------	1	0	2	2	0	0	0	4	39
Springfield	0	------	0	0	0	3	0	3	0	5	42
Worcester	0	------	0	57	5	2	0	0	0	0	54
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	20
Providence	0	------	0	0	1	2	0	4	1	3	55
Connecticut:											
Bridgeport	0	------	0	0	0	0	0	0	1	2	25
Hartford	0	------	0	1	3	1	0	0	0	7	36
New Haven	1	------	0	0	1	1	0	0	0	33	35
New York:											
Buffalo	0	------	1	2	7	8	0	4	1	20	148
New York	17	8	2	102	50	49	0	59	1	132	1,408
Rochester	0	1	0	1	1	5	0	1	0	18	68
Syracuse	0	------	0	0	1	3	0	1	0	4	36
New Jersey:											
Camden	0	------	0	28	0	5	0	0	0	1	17
Newark	0	------	0	5	2	19	0	2	0	22	69
Trenton	0	------	0	0	0	0	0	2	0	2	41
Pennsylvania:											
Philadelphia	2	2	0	134	13	22	0	21	1	123	412
Pittsburgh	0	3	3	0	10	5	0	7	0	34	189
Reading	0	------	0	0	0	0	0	0	0	48	24
Ohio:											
Cincinnati	2	------	1	0	4	10	0	4	0	5	127
Cleveland	0	8	1	0	8	19	0	1	0	58	188
Columbus	------	------	------	------	------	------	------	------	------	------	------
Toledo	0	4	4	1	5	4	0	4	0	5	78
Indiana:											
Anderson	0	------	0	0	0	1	0	0	0	0	7
Fort Wayne	0	------	0	0	0	0	0	1	0	1	28
Indianapolis	1	------	2	2	3	11	0	3	5	4	83
Muncie	0	------	0	1	2	0	0	0	0	0	13
South Bend	0	------	0	1	1	0	0	0	0	3	18
Terre Haute	0	------	0	0	0	0	0	0	0	0	17
Illinois:											
Alton	0	------	0	0	1	1	0	0	0	1	6
Chicago	5	2	0	101	19	87	0	40	2	117	668
Elgin	0	------	0	0	0	0	0	1	0	3	11
Moline	0	------	0	0	0	1	0	0	0	0	8
Springfield	0	------	0	0	0	6	0	0	0	12	16
Michigan:											
Detroit	7	------	0	72	7	44	0	12	0	132	245
Flint	0	------	0	1	3	1	0	0	0	7	27
Grand Rapids	0	------	0	0	1	8	0	0	0	49	26
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	0	9
Madison	0	------	0	------	1	0	0	1	0	7	16
Milwaukee	0	------	0	9	2	28	0	3	0	25	81
Racine	0	------	0	1	0	7	0	1	0	0	11
Superior	0	------	0	3	0	1	0	0	0	0	9

[1] Figures for Barre and Columbus estimated; reports not received.

City reports for week ended October 26, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	0	0	0	0	0	0	1	15
Minneapolis	0	------	0	1	0	17	0	1	0	12	76
St Paul	0	------	0	0	1	8	0	0	0	9	59
Iowa:											
Cedar Rapids	0	------	------	0	------	8	0	------	0	0	------
Davenport	0	------	------	0	------	5	0	------	0	0	------
Des Moines	1	------	0	0	0	6	0	0	0	0	27
Sioux City	0	------	------	0	------	3	0	------	0	4	------
Waterloo	1	------	------	0	------	1	0	------	0	0	------
Missouri:											
Kansas City	1	------	0	2	7	6	0	4	1	21	82
St Joseph	0	------	0	0	2	0	0	0	0	1	32
St Louis	7	4	0	1	5	18	0	5	2	14	199
North Dakota:											
Fargo	0	------	0	0	0	3	0	0	1	2	------
Grand Forks	0	------	------	0	------	0	0	------	0	1	------
Minot	0	------	0	0	0	0	0	0	1	0	3
South Dakota:											
Aberdeen	0	------	------	0	------	1	0	------	0	2	------
Sioux Falls	0	------	0	0	0	6	0	0	0	0	8
Nebraska:											
Lincoln	0	------	------	1	------	5	0	------	0	1	------
Omaha	0	------	0	0	5	3	0	2	0	1	55
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	4
Topeka	1	------	0	0	0	4	0	1	0	0	34
Wichita	0	------	0	0	8	3	0	0	0	7	31
Delaware:											
Wilmington	0	------	0	0	2	0	0	0	0	6	39
Maryland:											
Baltimore	1	2	1	0	5	11	0	6	1	76	213
Cumberland	0	------	0	0	3	1	0	0	0	1	13
Frederick	0	------	0	0	0	1	0	0	0	0	4
Dist. of Col.:											
Washington	0	------	0	2	5	8	0	11	0	7	172
Virginia:											
Lynchburg	2	------	0	0	1	1	0	0	0	0	8
Norfolk	1	------	0	0	1	0	0	1	0	3	23
Richmond	0	------	0	0	3	1	0	2	0	3	35
Roanoke	0	------	0	4	1	0	0	0	2	0	19
West Virginia:											
Charleston	0	------	0	0	0	0	0	0	0	1	10
Huntington	0	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	0	0	3	1	0	0	0	7	16
North Carolina:											
Gastonia	0	------	------	1	------	0	0	------	0	2	------
Raleigh	0	------	0	0	2	0	0	0	0	3	19
Wilmington	1	------	0	0	0	1	0	2	0	0	13
Winston-Salem	1	------	0	1	1	8	0	1	0	10	20
South Carolina:											
Charleston	1	11	0	0	3	2	0	0	1	0	19
Florence	0	1	0	0	0	0	0	0	0	0	7
Greenville	1	------	0	0	1	4	0	0	0	4	18
Georgia:											
Atlanta	0	6	0	0	6	3	0	6	0	1	97
Brunswick	0	------	0	0	2	0	0	0	0	2	5
Savannah	2	3	0	0	1	1	0	2	0	0	33
Florida:											
Miami	0	------	0	0	2	0	0	1	0	0	27
Tampa	0	------	0	0	0	2	0	1	0	1	30
Kentucky:											
Ashland	0	------	0	0	0	0	0	0	0	0	8
Covington	1	------	0	2	0	4	0	1	0	0	13
Lexington	0	------	0	4	0	0	0	1	0	8	14
Tennessee:											
Knoxville	0	------	0	0	0	4	0	0	0	0	21
Memphis	0	------	0	6	2	9	0	5	0	0	65
Nashville	0	------	1	2	2	4	0	4	1	6	59
Alabama:											
Birmingham	3	3	0	2	5	4	0	3	3	2	70
Mobile	1	1	0	0	0	0	0	0	0	0	17
Montgomery	0	------	------	0	------	0	0	------	0	0	------

City reports for week ended October 26, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0			0		1	0		0	0	
Little Rock	0		0	0	14	0	0	2	0	1	20
Louisiana:											
Lake Charles	1		0	0	0	1	0	0	0	0	5
New Orleans	3	1	0	0	14	3	0	7	1	1	145
Shreveport	3		0	0	2	1	0	0	0	0	16
Oklahoma:											
Oklahoma City	1		0	0	4	0	0	0	0	0	35
Tulsa	1		0	0	3	3	0	0	1	1	25
Texas:											
Dallas	3		0	0	1	2	0	1	0	3	61
Fort Worth	0		0	8	3	6	0	2	0	0	30
Galveston	0		0	0	2	0	0	0	0	0	12
Houston	1		0	0	6	2	0	1	0	0	72
San Antonio	0		1	0	4	2	0	5	0	1	57
Montana:											
Billings	0		0	0	1	1	0	0	0	0	14
Great Falls	0		0	0	0	0	0	0	0	0	
Helena	0		0	1	0	2	0	0	0	0	1
Missoula	0		0	0	0	0	0	0	0	0	6
Idaho:											
Boise	0		0	0	1	0	0	0	0	0	6
Colorado:											
Denver	5		0	5	8	6	0	2	0	0	65
Pueblo	0		0	0	2	3	0	1	0	2	13
New Mexico:											
Albuquerque	0		0	0	1	0	0	4	0	0	16
Utah:											
Salt Lake City	0		1	1	3	1	0	1	0	7	34
Washington:											
Seattle	5		0	1	4	1	0	2	3	6	86
Spokane	0		0	0	1	3	0	0	0	0	28
Tacoma	0		0	1	0	3	0	1	0	2	26
Oregon:											
Portland	0		0	0	2	2	0	1	1	0	81
Salem	0		0	0	0	0	0	0	0	1	
California:											
Los Angeles	0	8	0	7	3	23	0	11	0	60	369
Sacramento	0		0	1	7	4	0	0	0	3	38
San Francisco	0		0	2	2	10	0	6	1	21	156

State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths	
New Hampshire:			
Manchester	0	0	1
Rhode Island:			
Providence	0	0	1
Connecticut.			
Bridgeport	0	0	1
New York:			
New York	1	1	1
Syracuse	0	0	4
New Jersey:			
Newark	0	0	1
Pennsylvania:			
Pittsburgh	0	0	2
Ohio.			
Cincinnati	0	0	6
Cleveland	0	0	5
Toledo	0	0	2
Indiana:			
Indianapolis	0	0	1
Muncie	0	0	2
South Bend	0	0	1
Illinois:			
Chicago	0	0	18
Michigan.			
Detroit	0	0	1
Flint	0	0	1
Grand Rapids	1	0	3
Wisconsin:			
Madison	0	0	4
Milwaukee	0	0	2
Racine	0	0	1
Minnesota:			
Duluth	0	0	1
Minneapolis	0	0	2
Iowa:			
Des Moines	0	0	1
Waterloo	0	0	1
Missouri:			
Kansas City	0	0	5
St. Joseph	0	0	1
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	1
Kansas:			
Topeka	0	0	1
Virginia:			
Richmond	0	0	1
Roanoke	0	0	3
West Virginia:			
Huntington	0	0	1
North Carolina:			
Winston Salem	0	0	1
South Carolina:			
Florence	0	1	0
Kentucky.			
Lexington	0	0	1
Alabama:			
Birmingham	0	0	1
Louisiana:			
New Orleans	0	0	3
Shreveport	0	1	3
Texas:			
Fort Worth	0	0	1
Montana:			
Billings	0	0	1
Missoula	0	0	1
Colorado:			
Denver	1	0	1
New Mexico:			
Albuquerque	0	0	1
Washington:			
Seattle	0	0	4
California:			
Los Angeles	0	0	1
Sacramento	1	0	2

Encephalitis.—Cases: New York, 1; Pittsburgh, 1; Sacramento, 2
Pellagra.—Cases: Boston, 1; Charleston, S. C., 6; Savannah, 6.
Typhus fever.—Cases New York, 1; Atlanta, 1; Savannah, 7; Miami, 1; Tampa, 1; Birmingham, 1; Mobile, 1; Montgomery, 1; New Orleans, 1; Dallas, 1; Houston, 4.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 12, 1940.—During the week ended October 12, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1	2	1		1		1	6
Chickenpox		4	10	48	91	28	17	65	49	312
Diphtheria		9	1	38	2	3	2			55
Dysentery				3	1					4
Influenza		6			51				17	74
Measles	6	1	1	25	87	45	31	50	37	283
Mumps				7	70	18	4	10	17	126
Pneumonia	1				9	1			4	15
Poliomyelitis					9					9
Scarlet fever		1	6	56	73	9	6	15	10	176
Tuberculosis	5	5	8	50	39	2				109
Typhoid and paratyphoid fever			3	23	6				1	33
Whooping cough		24	2	200	110	17	10	53	7	423

VIRGIN ISLANDS (BRITISH)

Vital statistics—Year 1939.—The following table shows the numbers of marriages, births, and deaths in the British Virgin Islands during the year 1939:

Estimated population	6,500
Number of marriages	38
Number of births	226
Births per 1,000 population	19.23
Number of deaths	83
Deaths per 1,000 population	13.55
Deaths under 1 year per 1,000 live births	137.16
Deaths from:	
Cerebral hemorrhage	2
Gastroenteritis	8
Influenza	1
Deaths from—Continued.	
Meningitis	-
Nephritis, acute and chronic	5
Pellagra	1
Pneumonia (broncho)	3
Suicide	1
Syphilis	1
Tetanus, neonatorum	1
Tuberculosis (respiratory system)	8
All other causes	50

YUGOSLAVIA

Communicable diseases—4 weeks ended September 8, 1940.—During the 4 weeks ended September 8, 1940, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	53	5	Poliomyelitis	5	
Cerebrospinal meningitis	61	12	Scarlet fever	168	1
Diphtheria and croup	539	33	Sepsis	9	1
Dysentery	277	15	Tetanus	50	21
Erysipelas	136	2	Typhoid fever	310	17
Favus	3		Typhus fever	9	
Lethargic encephalitis	1	1	Weil's disease	1	
Paratyphoid fever	40				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of October 25, 1940, pages 1973–1976. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Area.—A rat found on October 9, 1940, and another rat found on October 10, 1940, both in Paauhau Area, Hamakua District, Island of Hawaii, Hawaii Territory, have been proved positive for plague.

Yellow Fever

Sudan (French)—Markala Circle—Segou.—On November 3, 1940, 1 suspected case of yellow fever was reported in Segou, Markala Circle, French Sudan.

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Public Health Reports

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IN THIS ISSUE

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

October 6–November 2, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended November 2, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935–39.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—The number of cases of influenza rose from approximately 1,300 during the preceding 4-week period to approximately 3,300 for the 4 weeks ended November 2. The current incidence was slightly lower than that for the corresponding period in 1939, but more than 10 percent above the 1935–39 median incidence for this period. In the South Atlantic, West South Central, and Mountain regions the number of cases was higher than the seasonal expectancy, but in all other regions the disease appeared to be less prevalent than in preceding years.

Measles.—The incidence of measles in relation to that for the same period in 1939, and also to the 1935–39 median incidence, was considerably higher in the New England, Middle Atlantic, and East North Central regions and slightly higher in the East South Central region, but all other regions showed decreases. For the country as a whole, the number of cases reported (6,083) represented an increase of approximately 35 percent over the normal seasonal expectancy.

Poliomyelitis.—The number of cases of poliomyelitis dropped from 2,859 during the 4-week period ended October 5 to 1,789 during the current period. Each geographic region, and each State in which the disease was unusually prevalent, shared in the decline. The incidence was, however, considerably in excess of that for recent years, the number of cases being 1.5 times the number reported for the same

period in 1939 and almost twice the 1935–39 median figure for the period.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Oct. 6–Nov. 2, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	1,850	3,219	3,943	3,285	3,361	2,832	6,083	4,506	4,513	106	135	243
New England	27	31	42	4	6	13	851	583	456	8	7	10
Middle Atlantic	138	215	256	31	50	73	2,307	568	740	9	27	43
East North Central	194	410	592	224	188	261	1,681	418	570	24	25	44
West North Central	128	131	302	39	46	157	265	381	381	11	12	16
South Atlantic	610	1,473	1,391	1,144	1,456	768	191	412	412	18	20	52
East South Central	256	439	656	136	241	268	190	53	155	19	20	28
West South Central	338	355	509	1,127	1,005	830	82	128	90	3	11	13
Mountain	53	95	118	456	272	200	258	516	476	7	3	9
Pacific	106	70	152	124	97	158	238	1,447	1,078	7	10	10
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	1,789	1,163	902	7,928	9,382	11,116	77	119	225	888	1,096	1,388
New England	13	29	29	403	372	575	0	0	0	25	28	28
Middle Atlantic	92	309	122	1,265	1,545	1,753	0	0	0	99	132	177
East North Central	742	215	190	2,355	2,866	3,915	36	24	45	109	186	190
West North Central	463	170	78	963	1,147	1,430	20	29	89	59	67	107
South Atlantic	204	69	64	1,211	1,390	1,301	0	1	2	190	212	286
East South Central	58	64	56	663	729	725	4	6	6	134	120	157
West South Central	49	43	40	350	301	423	9	21	12	164	195	271
Mountain	65	125	18	232	377	523	4	19	52	56	70	115
Pacific	103	139	95	486	655	803	4	19	35	52	86	69

[1] 48 States. Nevada is excluded and the District of Columbia is counted as a State in these reports.
[2] 44 States and New York City.
[3] 47 States. Mississippi is not included.

From a comparison of the recent reports of poliomyelitis with the incidence in recent years, it is evident that the present outbreak has been largely confined to the North Central and South Atlantic regions, with very little rise in the South Central and far western regions, and none in the North Atlantic regions. In the regions where the disease has been most prevalent the incidence is still more than three times the normal seasonal incidence, and in the Mountain region, while the number of cases (65) is not large, it also is more than three times the 1935–39 median figure for this period. It is not unusual that the present outbreak has been confined to certain areas for, with the exception of the outbreak in 1939, which was quite widespread, previous epidemics have been confined more or less to certain geographic areas. The minor outbreaks of 1936 and 1937 occurred mostly in States in the South Central regions, while in 1934 California and other

western States experienced a more severe outbreak. In 1931, 1933, and 1935 the disease was epidemic in States along the Atlantic Coast; there was no epidemic of this disease in 1938, and 1932 was also a non-epidemic year.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria continued at a relatively low level. For the 4 weeks ended November 2 there were 1,850 cases reported, as compared with 3,219 for the corresponding period in 1939, and a median of 3,943 cases for the years 1935–39. The incidence for the country as a whole was the lowest on record for this period.

Meningococcus meningitis.—For this disease the incidence continued very favorable during the current period. The total number of reported cases was 106, as compared with 135, 168, and 246 cases for the corresponding period in 1939, 1938, and 1937, respectively. The situation was favorable in all sections of the country.

Scarlet fever.—The reported current incidence of scarlet fever (7,928 cases) was about 85 percent of the incidence for the corresponding period in 1939, and about 70 percent of the 1935–39 median incidence for this period. In the New England region the number of cases was slightly above the number reported last year, but all regions participated in a decline from the median figures for this period, the decreases ranging from less than 7 percent to more than 45 percent in the various regions.

Smallpox.—While the number of cases of smallpox increased about 75 percent over the incidence during the preceding 4-week period, the total of 77 cases was the lowest number on record for this period. No cases were reported from the Atlantic coast regions and very appreciable declines from the preceding 5-year averages were reported from other regions.

Typhoid and paratyphoid fever.—The incidence of typhoid and paratyphoid fever was also relatively low in all sections of the country. The number of cases reported for the 4 weeks ended November 2 was 888, which was the lowest number on record for this period.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended November 2, based on data received from the Bureau of the Census, was 11.0 per 1,000 inhabitants (annual basis). The rate for the corresponding period in 1939 was 10.9, as was also the average rate for the years 1935–39.

A COMPREHENSIVE STUDY OF INFLUENZA IN A RURAL COMMUNITY[1]

By E. R. Rickard, M. D., Edwin H. Lennette, M. D., and Frank L. Horsfall, Jr., M. D.

NOMENCLATURE

The nomenclature which has come into general use among students of clinical influenza has become unwieldy, confusing, and not as specific as could be desired. The need for a more exact terminology has been recognized by many investigators. The desirability of using precisely defined terms in this field has become even more apparent as additional evidence has been acquired indicating that the symptom-complex historically called influenza is not a single etiological entity. Large epidemics of the clinical disease have been described by Francis (*1*) and by Stuart-Harris, Smith, and Andrewes (*2*) in which no evidence was obtained that the ferret pathogenic virus originally discovered by Smith, Andrewes, and Laidlaw (*3*) was concerned. Recently those associated with influenza research in the laboratories of the International Health Division of the Rockefeller Foundation, New York, and in the National Institute for Medical Research, London, agreed to use in the future a nomenclature (*4*) which was considered to be sufficiently exact to be consistent with present knowledge and which also would permit of logical expansion as additional information was acquired. The cooperation of other workers in this field of investigation was invited.

Since the statement issued jointly by the workers in the two institutions mentioned above suggesting this nomenclature was at the time of this writing in press and inasmuch as it will be used throughout this paper, it is reprinted here in summary form.

Clinical influenza.—An etiologically indefinite symptom-complex long recognized by physicians and characterized by the presence of the clinical manifestations which in recent years have been enumerated and described by Stuart-Harris, Andrewes, and Smith (*2*, *5*), Francis (*6*), Francis, Magill, Beck, and Rickard (*7*), and Horsfall, Hahn, and Rickard (*8*). The term includes the symptom complexes referred to by Stuart-Harris et al. (*2*, *5*) as "febrile catarrhs"; a sharp separation of these on clinical or epidemiological grounds has proved exceedingly difficult to establish.

Influenza A.—A specific disease entity caused by infection with any one of the various strains of the virus discovered by Smith, Andrewes, and Laidlaw (*3*), which will hereinafter be termed influenza A virus.

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[1] From the Laboratories of the International Health Division of the Rockefeller Foundation and the Westchester County Department of Health, New York.

The separation of influenza A leaves a disease or group of diseases clinically resembling it but as yet of unknown etiology. (If and when hitherto undescribed viruses are isolated from this group and are shown to be of etiological significance, other specific diseases in the group could be labeled influenza B, C, etc., as they are found to be caused by the as yet hypothetical agents, influenza B virus, C virus, etc.; if agents other than viruses are implicated, the diseases in question should be given appropriate names which cannot be confused with those of the virus diseases.)

Influenza A virus.—The virus discovered by Smith, Andrewes, and Laidlaw (*3*) was originally termed "influenza virus," or "human influenza virus," and more recently "epidemic influenza virus." If and when other "influenza viruses" are isolated from patients they could be labeled influenza B virus, C virus, etc., to correspond with the diseases, influenza B, C, etc."

For the purposes of conciseness it has been useful in the present report to assign the term "influenza X" to that disease or group of diseases of unknown etiology which, though clinically indistinguishable from influenza A, can readily be differentiated from it by appropriate laboratory tests.

INTRODUCTION

The discovery of influenza A virus (*3*) has led to the development of neutralization (*9*, *10*) and complement fixation (*11*, *12*, *13*) tests for the presence of specific antibodies against the virus in the serum of human beings. In epidemics in which influenza A virus has been isolated from patients with the disease, marked increases in antibody titers have been demonstrated by means of both tests, when sera taken during the first 2 or 3 days of illness were compared with sera taken during the first few weeks of convalescence (*2*, *8*, *13*). The diagnostic value of these tests may, therefore, be considered definitely established. Relatively little is known, however, as to the distribution of antibody titers in the sera of a normal population during nonepidemic periods, or as to the persistence of individual antibody levels in the absence of manifest infection by the virus. Moreover, the relationship of antibody titer to immunity or susceptibility to the disease and the importance of subclinical infections in the determination of antibody levels have only been suggested on the basis of evidence obtained by certain investigators (*13*, *14*).

To permit a comprehensive investigation of these and other questions, a long-term study of clinical influenza and related respiratory diseases was begun during January 1938 in Yorktown, Westchester County, N. Y. This locality was chosen because of the impression that the stable, representative character of the population would

allow the greatest generalization in the interpretation of the results obtained from the investigation.

ORGANIZATION OF THE PROGRAM IN THE RESPIRATORY DISEASE OBSERVATION AREA

The town of Yorktown is a rural district suburban to New York City. Forty-five square miles of the area of the town were taken as the sphere of the study. Within this area were some 2,000 permanent residents of whom 800 lived in the unincorporated village of Yorktown Heights. In the village was located a consolidated school which served a district coinciding almost exactly with the area of the influenza study.

The program was begun by a house-to-house canvass during which the people were informed of the nature of the project, and registry cards were made out for all persons who expressed willingness to cooperate in the study. Data in regard to age, sex, length of residence in the locality, amount of travel, and past history of clinical influenza were recorded for each individual, a total of 1,336 persons distributed in 387 families being so registered. Beginning in March 1938, following a period of 1 year in which no known epidemics of influenza A had occurred throughout the world, blood specimens were obtained from more than 1,100 individuals from 4 to 85 years of age who were registered for the study. Constant contact with the population during the several months required to obtain the original blood specimens gave assurance of the continued absence of influenza A in the area during that interval.

NEUTRALIZATION AND COMPLEMENT FIXATION TESTS UPON 1938 SERA

The neutralization titers of the 1938 sera were determined against the PR8 strain (*15*) of influenza A virus propagated in mouse lung. Sera were regularly examined in final dilutions of 1:4, 1:16, and 1:64. Additional tests with dilutions to as high as 1:256 or 1:1024 were done when necessary. Generally from 50 to 100 sera were included in each test. Four mice were inoculated with each serum dilution-virus mixture and six mice with each dilution of the virus, which was titrated in every test. The mice were observed for a period of 10 days. All mice which survived the observation period were killed and their lungs examined for pulmonary consolidation. Both the serum dilution end points and the virus titration end points were calculated by the 50 percent mortality method of Reed and Muench (*16*). The serum dilution end points were then adjusted so that they could be expressed in terms of the neutralization of a constant amount of virus. This was accomplished by means of the linear relationship between the quantity of serum and the quantity

of virus neutralized, as described by Horsfall (*17*). That dilution of serum which was capable of neutralizing 3,100 fifty percent mortality doses of virus was designated as the "standard neutralization titer." All serum neutralization titers to be presented have this value.

TABLE 1.—*Frequency distribution of standard neutralizing antibody titers according to age*

Standard titer range	Individuals classified according to age group (years)														Total, all ages	
	4-9		10-19		20-29		30-39		40-49		50-59		60+			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<1:4	60	53	59	27	65	36	93	42	63	42	64	63	87	74	491	45
1:4 to 1:15	33	28	85	39	74	41	71	32	50	33	20	19	23	19	356	32
1:16 to 1:63	18	16	58	27	35	20	51	23	33	22	15	14	8	7	218	20
1:64 to 1:255	3	3	14	7	5	3	6	3	4	3	4	4	0	0	36	3
Total in groups	114	100	216	100	179	100	221	100	150	100	103	100	118	100	1,101	100
Mean titers	1:13.4		1:25.0		1:16.4		1:16.8		1:16.4		1:14.0		1:4.7		1:16.4	

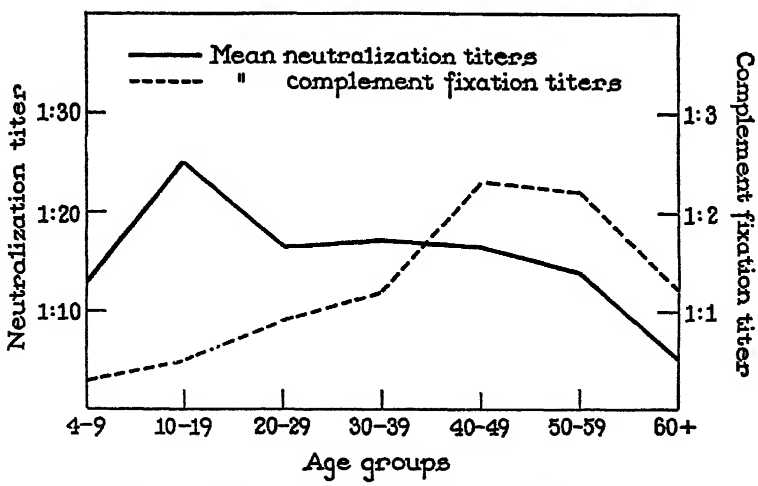

FIGURE 1.—Comparison of variation of mean antibody titers by neutralization and complement fixation tests in different age groups.

In table 1 the frequency distribution of the standard neutralization titers of 1,101 sera obtained during 1938 is summarized according to age groups. In the distribution of titers among persons of all ages it was revealed that 45 percent of the population possessed low titers of less than 1: 4 serum dilution, 32 percent had medium titers of from 1: 4 to 1:15, 20 percent had high titers of from 1: 16 to 1: 63, and only 3 percent were found with very high titers of from 1: 64 to 1: 255. The mean titers of the various age groups, as illustrated in figure 1,

indicated that the incidence of sera with high titers was greatest in the adolescent group of from 10 to 19 years, while during adult life there was a remarkable constancy of mean neutralizing antibody levels. In late adult life a slight fall in mean titer occurred, and in advanced age, beyond 60 years, this decrease became very marked.

Complement fixation tests were done upon 807 of the original 1,101 sera collected during 1938. PR8 mouse lung antigen standardized against a pool of convalescent human serum as described by Eaton and Rickard (*18*) was used throughout; otherwise the test did not differ materially from that used by Francis, Magill, Rickard, and Beck (*13*). Original serum dilutions of 1: 4 and 1: 16 were regularly employed. Additional tests with serum dilutions to as high as 1: 256 were done when necessary. The use of 1: 2 dilutions of serum was not practicable because it was found that at this dilution a large proportion of the sera either were anticomplementary or gave positive reactions with normal mouse lung antigen. Dilutions higher than 1: 16 were not considered to be regularly necessary because of the almost universal absence of fixation by normal sera at greater dilutions (*18*).

The frequency distribution of the complement fixation titers according to age groups is summarized in table 2. Among persons of all ages there were 78 percent whose sera did not fix complement at a dilution of 1: 4, 20 percent whose sera did fix complement at that dilution but not above, and only 2 percent whose sera fixed complement at a dilution of 1: 16. The mean titers of the different age groups are illustrated in figure 1 where the differences in mean titers obtained by the complement fixation tests may be compared to those obtained by the neutralization tests. It is readily apparent that a higher titer of complement-fixing antibodies is characteristic of late adult life, in contrast to the higher titer of neutralizing antibodies found in adolescence. Advanced age is marked by a reduction of the mean titers of both antibodies.

TABLE 2.—*Frequency distribution of complement fixing antibody titers according to age*

Titer of fixation	Individuals classified according to age group (years)														Total all ages	
	4–9		10–19		20–29		30–39		40–49		50–59		60+			
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
No fixation 1:4	88	97	150	88	82	78	125	75	66	63	51	66	68	76	630	78
Fixation 1:4	2	2	19	11	23	22	38	23	33	30	23	28	20	22	158	20
Fixation 1:16	1	1	1	1	0	0	3	2	7	7	5	6	2	2	19	2
Total in groups	91	100	170	100	105	100	166	100	106	100	79	100	90	100	807	100
Mean titers	1:0.3		1:0.5		1:0.9		1:1.2		1:2.3		1:2.2		1:1.2		1:1.2	

An analysis of both the neutralization and complement fixation titers in relation to sex, amount of travel, length of residence in the locality and history of clinical influenza of the persons from whom sera were obtained in no case revealed any differences in antibody levels attributable to these factors.

In table 3 the frequency distribution of individual sera in different neutralization titer ranges is compared with the distribution of the same sera according to complement fixation titers. In spite of the different trends of the neutralization and complement fixation titers with age, as shown in figure 1, there is some correlation between these two titers for individual sera. The amount of this correlation is small ($r=+0.259$) but real ($P<0.01$).

TABLE 3.—*Comparison between neutralization and complement fixation titers of the same individuals' 1938 sera*

Complement fixation titers	Neutralization titer ranges: 1:4		1:4–1:15		1:16–1:63		1:64–1:255		Total		Mean neutralization titers
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
No fixation 1:4	300	88 2	201	77	110	64	16	57	627	78	1·14
Fixation 1:4	39	11.5	56	21	53	31	9	32	157	20	1 26
Fixation 1:16	1	.3	6	2	9	5	3	11	19	2	1:47
Total	340	100.0	263	100	172	100	28	100	803	100	1:17
Mean complement fixation titers	1:0.5		1:1.1		1:2.1		1:3.0		1:1.2		

INCIDENCE OF ACUTE UPPER RESPIRATORY DISEASE IN THE OBSERVATION AREA DURING THE 1938–39 SEASON

From the beginning of October 1938 to the end of May 1939 a systematic search for cases of acute upper respiratory disease was carried out among the population under observation. In cooperation with the local school nurse the cause of absences from school due to illness was verified by a nurse trained in epidemiological procedure. In addition, periodic calls were made by telephone or by personal visits to responsible members of the families under observation. The frequency of these calls is summarized by months in table 4.

TABLE 4.—*Summary of calls made to determine the presence of acute upper respiratory disease among members of families registered in the observation area, October 1938 to May 1939, inclusive*

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Number of families receiving 3 or more calls	13	3	13	8	190	34	32	56
Number of families receiving 2 calls	108	17	73	78	79	139	82	83
Number of families receiving 1 call	187	157	237	195	68	110	200	136
Total number of families registered for the study	387	382	357	340	342	343	346	346
Number of persons in these families	1,336	1,324	1,386	1,348	1,345	1,347	1,343	1,342

In order to simplify the possible clinical classifications, all cases of acute upper respiratory disease were classified under the two headings, "common colds" and "clinical influenza." No attempt was made to classify so-called "febrile catarrhs" (*5*) or "sporadic grippe" (*8*). Persons presenting signs of coryza, occasionally accompanied by vague or indefinite symptoms such as slight achiness or mild malaise, with oral temperatures of 99° F. or less, and sometimes even with such complications as laryngitis or tracheo-bronchitis, were classified as cases of "common cold." The clinical manifestations described by previous authors (*2, 5, 6, 7, 8*) were followed and persons whose illness had a relatively sudden onset with temperatures of more than 99° F., together with definite constitutional symptoms such as headache, body pains, and malaise, and with upper respiratory symptoms either slight or pronounced were considered as having "clinical influenza." Sinusitis, tonsillitis, and chronic "nasal catarrh" were not considered as acute upper respiratory diseases for the purpose of this study.

The prevalence of these two broad clinical types of acute upper respiratory disease among persons in the observation area during the 1938–39 season is shown in table 5. The cases classified as "clinical influenza" have been subdivided according to the results of laboratory tests on sera and throat washings obtained from them.

TABLE 5.—*Incidence of acute upper respiratory disease among members of families registered in the observation area, October 1938 to May 1939, inclusive*

	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	Apr.	May	Total	Per-cent
Clinical diagnosis:										
"Common colds"	102	75	155	192	165	70	48	53	860	85
Clinical influenza	2	2	4	16	94	16	6	7	147	15
Total	104	77	159	208	259	86	54	60	1,007	100
Laboratory diagnosis:										
Influenza A	0	0	0	9	47	3	0	0	59	40
Influenza X	2	0	1	1	17	9	5	0	35	24
Not tested	0	2	3	6	30	4	1	7	53	36
Total	2	2	4	16	94	16	6	7	147	100

Under "influenza A" are classified those persons who were ill and whose serum taken during the first few weeks of convalescence showed more than a fourfold increase in neutralization titer as compared to the neutralization titer of the same individual's preepidemic serum. Influenza A virus was demonstrated in throat washings from 11 of these persons during the acute stage of illness (*8*).

Under "influenza X" are grouped those patients whose preepidemic and convalescent antibody titers showed no significant increases either by the neutralization or the complement fixation tests. At-

tempts to demonstrate influenza virus in throat washings taken from eight of these patients were unsuccessful.

The section "not tested" includes cases from which either pre-epidemic or convalescent blood specimens were not available. No attempt was made to isolate influenza A virus in throat washings from this group.

The symptoms presented by the patients in these three subdivisions did not differ materially; and on clinical evidence alone the differentiation of the cases of influenza A would have been impossible. The symptoms and clinical signs which were observed have been described in another publication (*8*).

It may be noted that "common colds" were prevalent throughout the entire period of observation, but that the greatest number occurred in the months of December, January, and February. Although the highest incidence of the "common colds" fell in January about 1 month before the peak of "clinical influenza," "colds" were still very prevalent during February when 64 percent of all clinical influenza and 80 percent of influenza A occurred.

NEUTRALIZATION TESTS UPON SERA TAKEN AFTER THE EPIDEMIC

In March 1939, blood specimens were obtained from the majority of the persons who had suffered from clinical influenza during the 2 previous months. In April, May, and June a second general bleeding program was carried out and specimens were obtained from 819 of the same individuals who had furnished sera in 1938. At the time of the bleeding each person was questioned by a physician as to the occurrence of symptoms suggestive of influenza during the previous winter months in order to discover whether any clinical cases had been missed.

Neutralization tests were performed upon all of the 1939 sera according to the same technique used for the examination of sera taken during 1938. In addition to the significant antibody increases already noted in the sera of persons who were ill, significant increases in neutralization titers were observed in the sera of 63 individuals who gave no history of illness suggestive of influenza. Thirty-six of these individuals gave histories of the "common cold" in the interval between the taking of the first and second blood specimens. The incidence of the "common cold" in this group was no greater, however, than among the 691 individuals whose sera showed no antibody increase during the same interval.

In spite of frequent contact which had been maintained, as shown in table 4, no history could be elicited of an influenzalike illness sufficiently severe to impress the memory of any of these 63 individuals. It therefore seemed likely that symptoms of infection by influenza

A virus were absent entirely, or so mild as to justify the application of the term "subclinical infections" to these cases. Seventeen, or 27 percent of these individuals were in close personal association with cases of influenza A during the acute phase of illness.

In table 6 under the section "preepidemic sera" is shown the distribution of neutralization titers of sera taken during 1938 from individuals who likewise furnished sera in 1939. It is obvious that knowledge concerning the general distribution of antibody titers before an epidemic must be available, if the significance of clinical cases or of subclinical infections occurring among persons possessing various antibody levels is to be evaluated properly. In the second section of the table the incidence of frank cases of influenza A proved by significant increases in antibodies, as well as the incidence of subclinical infections in relation to the different levels of neutralization titer, is demonstrated. In both instances it will be noted that the attack rates were highest in the group of persons possessing the lowest levels, and became progressively lower in the two succeeding groups. The number of individuals found with neutralization titers of from 1:64 to 1:255 was too small to allow statistically significant attack rates. Nevertheless, the occurrence of one case of influenza A and one subclinical infection in this group demonstrated that the possession of even very high neutralization titer was not an absolute indication of immunity. The highest attack rate of frank cases in the <1:4 antibody range together with the higher rate for subclinical infections than for frank cases in the 1:4 to 1:15 range suggested that the titer of neutralizing antibodies may have been one factor in determining the severity of the disease caused by infection with influenza A virus. These differences were not large, however, and the number of cases in either series did not allow great statistical significance for the differences noted. Taken as a whole, the trends displayed in the attack rates of cases and subclinical infections were remarkably similar. The mean titers of the preepidemic sera of the two groups were identical.

TABLE 6.—*Comparison between standard neutralization titers of sera obtained during 1938 and incidence of clinical and subclinical influenza A during 1939 in the same individuals*

Preepidemic 1938 sera			1939 influenza A			
Standard titer ranges	Individuals		Clinical cases		Subclinical infections	
	Number	Percent	Number	Attack rate, percent	Number	Attack rate, percent
<1:4	352	43	48	13 6	39	11.1
1:4 to 1:15	263	32	7	2.7	21	8.0
1:16 to 1:63	176	22	3	1.7	2	1.1
1:64 to 1:255	29	3	1	3 4	1	3 4
Total	820	100	59	7.2	63	7 7
Mean titers of 1938 sera	1:17		1:5		1:5	

It might be thought that individuals with low titer sera would respond to an attack of influenza A with a greater increase in antibodies against the virus than would persons with higher titers. An analysis of the antibody increases observed in this laboratory during the 1939 epidemic has revealed that this was not the case. The mean increase in antibodies observed in the serum of patients in the <1:4 range was not significantly higher than in the 1:4 to 1:15 range and was only twice as great as in the 1:16 to 1:63 range. On this basis, the observed attack rates in the different titer ranges become increasingly significant and suggest that a low titer of neutralizing antibodies against influenza A virus and susceptibility to influenza A are related.

The increases in neutralization titers of convalescent sera as compared to preepidemic sera of persons ill with confirmed influenza A varied markedly in different individuals. The maximum increase in titer was 185 times, while the minimum increase was 4.5 times. In 12 cases, or 20 percent of the series, the neutralization titer of the sera taken during convalescence was less than 1:16, a titer lower than that of the preepidemic sera of certain other individuals who contracted influenza A. With the sera from persons affected by subclinical infections similar results were obtained. The maximum increase in titer was 157 times and the minimum increase just over 4 times. The titers of the sera of 5 individuals, or 8 percent of the series, did not increase to 1:16. Observations similar to these in regard to cases of influenza A already have been recorded by other workers (*13*).

In the spring of 1940, approximately 1 year after the influenza A epidemic, blood specimens were obtained from 49 of the 59 persons who had suffered from proved influenza A and from 44 of the 63 who had had subclinical infections. All the individuals from whom sera were obtained in 1940 had remained resident in the community and during the interval the same type of observation for the presence of acute upper respiratory disease had been maintained. No influenza epidemic occurred during the winter of 1939–40 and such sporadic cases of clinical influenza as did occur in the community during this period were shown not to be due to influenza A virus since no significant increases were found in circulating antibodies of sera taken during convalescence. Neutralization tests done upon the 1940 sera revealed that, as was the case with the antibody response to infection by influenza A virus, there was a great variation among different individuals in the decline of neutralization titers after a period of 1 year following infection. These variations are summarized in table 7. It will be noted that in 19 percent of instances the individuals' neutralizing antibodies returned to their preepidemic levels. In 23 percent, however, no decline in the convalescent antibody level resulting from infection was demonstrable after 1 year; and in the remaining in-

stances, although decline of neutralizing antibody had taken place after the same interval, there was still a definite residual humoral immunity as measured by the neutralization test.

TABLE 7.—*Comparison between neutralization titers of sera taken 1 year after the epidemic of influenza A and titers of preepidemic sera from the same individuals*

Changes in titers of 1-year postepidemic sera as compared to titers of preepidemic sera	Clinical cases, number of individuals	Subclinical infections, number of individuals	Total clinical cases and subclinical infections	
			Number of individuals	Percent
Decreased to original titer ranges	10	8	18	19
Decreased to titer ranges 4 times above ranges of preepidemic sera	21	18	39	42
Decreased to titer ranges 16 times above ranges of preepidemic sera	3	10	13	14
Decreased to titer ranges 64 times above ranges of preepidemic sera	1	1	2	2
Remained in same titer ranges as convalescent sera	14	7	21	23
Total	49	44	93	100

Data in regard to rise and fall of titers of neutralizing antibodies are concisely summarized in table 8 where the similarity of antibody response to infection by influenza A virus, with or without clinical manifestations, is quite apparent. In both cases the mean neutralization titers of the 1-year postepidemic sera of persons who had been infected were approximately double the mean titer of the general population under study, and were five times greater than the mean titer of the preepidemic sera of the individuals who had been infected. These facts may aid somewhat in effecting a better understanding of the apparent 2-year periodicity of epidemics of influenza A.

TABLE 8.—*Comparison of mean neutralization titers of preepidemic and convalescent sera and of sera taken 1 year after the epidemic from the same individuals*

	Clinical cases		Subclinical infections	
	Number of individuals	Mean titers	Number of individuals	Mean titers
Titers of preepidemic sera	59	1:5	63	1:5
Titers of convalescent sera	59	1:126	63	1:77
Increase in titers of convalescent over preepidemic sera	59	25X	63	15X
Titers of 1-year postepidemic sera	49	1:23	44	1:26
Increase in titers of postepidemic over preepidemic sera	49	5X	44	5X

A comparison between the neutralization titers of the 1938 and 1939 sera of 691 individuals whose sera had shown no significant increase in neutralizing antibodies revealed, rather surprisingly, that a particular neutralizing titer was almost a personal characteristic. The results of titrations of two sera obtained from each of the 691 individuals 1 year apart are shown in table 9 where it will be seen that, irrespective of the 1938 level of neutralization titer of a particular

person's serum, there was a definite tendency for that titer to remain constant for at least 1 year. It will be noted that 64 percent of the titers did not change, 28 percent increased less than four times, and 8 percent decreased less than four times. These minor alterations in titer were not sufficiently great to exceed the experimental error inherent in the test. The neutralization titers of the sera of only four persons, or less than 1 percent of the series, decreased more than four times.

TABLE 9.—*Comparison between standard neutralization titers of 2 sera taken 1 year apart from each of 691 individuals*

1938 sera		1939 sera		Comparison between individuals' 1938 and 1939 sera		
Standard titer range	Number of individuals	Standard titer range	Number of individuals	No change	Less than 4 times increase	Less than 4 times decrease
				Percent	*Percent*	*Percent*
<1:4	262	*<1:4*	175	67		0
		1:4 to 1:15	87		33	
		1:16 to 1:63	0			
		1:64 to 1:255	0			
		<1:4	11			5
1:4 to 1:15	232	*1:4 to 1:15*	146	63		
		1:16 to 1:63	75		32	
		1:64 to 1:255	0			
		<1:4	2			
		1:4 to 1:15	36			21
1:16 to 1:63	170	*1:16 to 1:63*	103	61		
		1:64 to 1:255	29		16	
		<1:4	0			
		1:4 to 1:15	2			
		1:16 to 1:63	9			33
1:64 to 1:255	27	*1:64 to 1:255*	16	59	0	
Total	691			64	28	8

Quite obviously, this analysis would have been facilitated had it been possible to consider the entire group from whom two serum specimens were available. The occurrence of an epidemic of influenza A in the interval, however, and the well-established fact that infection by influenza A virus causes an increase in specific neutralizing antibodies made it necessary to withdraw the group proved to have been infected by the virus from the population under consideration. Under these circumstances significant decreases in titer were the only alterations which could be observed. As is shown in table 9, a total of 429 individuals possessed, in 1938, sera with titers sufficiently high so that significant decreases could have been demonstrated in 1939 had they occurred. Since only four individuals showed a significant decrease, it seems evident that very little alteration in individual titers occurred in 1 year.

In order to determine if the constancy of individual titers would be maintained for a longer interval, during the spring of 1940 blood specimens were obtained from 124 of the same persons whose sera

had been examined in 1938 and 1939. The results of the neutralization tests done upon the 1940 specimens are summarized in table 10, where titers of 1940 sera are compared to the 1938 titers of the same individuals. It may be noted that in the two lower ranges of titer the same constancy of neutralizing antibody was maintained for 2 years. In the higher ranges, however, although a large proportion of persons still maintained their original titers, there was a definite tendency for the neutralizing antibodies of other individuals to decrease. A change of less than four times in the titer of any one individual's serum may be considered as within the experimental error of the test. Nevertheless, when the sera of 35 percent of the group showed a decrease in titer of less than four times and still another 5 percent, a decrease of more than four times, while only 5 percent increased less than four times, it would appear that there had been some waning of neutralizing antibodies. In consideration of the age distribution of mean neutralization titers as illustrated in table 1 and figure 1, the loss of antibodies by certain individuals over a long period of time should be expected.

TABLE 10.—*Comparison between standard neutralization titers of 2 sera taken 2 years apart from each of 124 individuals*

1938 sera		1940 sera		Comparison beween individuals' 1938 and 1940 sera			
Standard titer range	Number of individuals	Standard titer range	Number of individuals	No change	Less than 4 times increase	Less than 4 times decrease	More than 4 times decrease
				Percent	*Percent*	*Percent*	*Percent*
<1:4	19	*<1:4*	19	100		0	0
		1:4 to 1:15			0		
		1:16 to 1:63					
		1:64 to 1:255					
		<1:4	12			26	0
1:4 to 1:15	46	*1:4 to 1:15*	28	61			
		1:16 to 1:63	6		13		
		1:64 to 1.255					
		<1:4	5				9
		1:4 to 1:15	24			49	
1:16 to 1:63	49	*1:16 to 1:63*	19	39			
		1:64 to 1:255	1		2		
		<1:4					
		1:4 to 1:15	2				20
		1:16 to 1:63	7			70	
1:64 to 1:255	10	*1:64 to 1:255*	1	10	0		
Total	124		124	54	5	35	5

COMPLEMENT FIXATION TESTS

Complement fixation tests were done upon the majority of the 1938 and 1939 sera. In all instances the same individual's two sera were examined in one test in order to exclude as many extraneous variants as possible in the interpretation of differences in titer. Fixation was

recorded according to the usual system of + to ++++ in degrees of lack of hemolysis. Plus one fixation was not considered significant and an increase of ++ or more degrees of fixation from the pre-epidemic to the convalescent serum specimen was considered as a significant increase in titer. In the sera of all but five persons significant increases in neutralizing antibodies were confirmed by significant increases in complement-fixing antibodies. The sera of three of these individuals in 1:2 dilutions showed suggestive increases but in the sera of the two remaining persons no complement fixing antibody increase whatever could be demonstrated. In four other instances, however, confirmation of the increase in neutralizing antibodies could only be demonstrated by the use of 1:2 dilutions. The increase in neutralization titers noted in the sera of the nine persons showing little or no increase in fixation of complement did not differ materially from those noted in sera in which definite complement fixation increases had been observed.

In table 11 the relationship of complement-fixing antibody titers to the incidence of cases of proved influenza A and of subclinical infections by influenza A virus as established by significant neutralization titer increases is shown. This table is comparable to table 4 which demonstrates the same data for the neutralization tests. As in the case of the neutralization tests attack rates for frank cases and subclinical infections are very similar at the different antibody levels. Although in both instances the attack rates were more than two times higher in the group showing no fixation at a serum dilution of 1:4 than in the group with fixation at that dilution, the complement fixation titers gave only partially as clear an indication of susceptibility to infection by influenza A virus as did the neutralization titers. The small number of individuals whose sera showed positive fixation at a dilution of 1:16 gave very little statistical significance to the attack rates for that group, but it is evident that a high titer of complement-fixing antibodies, like a high titer of neutralizing antibodies, did not absolutely preclude the possibility of infection by the virus.

TABLE 11.—*Comparison between complement fixation titers of sera obtained during 1938 and incidence of clinical and subclinical influenza A during 1939 in the same individuals*

Preepidemic 1938 sera			1939 influenza A			
Titer range	Individuals		Clinical cases		Subclinical infections	
	Number	Percent	Number	Attack rate, percent	Number	Attack rate, percent
No fixation 1.4	621	78	53	8 5	57	9. 2
Fixation 1:4	158	20	5	3 2	6	3 8
Fixation 1:16	19	2	1	5 3	0	0
Total	798	100	59	7 4	63	7. 9
Mean titers, preepidemic sera	1:1.2		1·0.6		1.0.4	

Increase in complement fixation titers of the convalescent sera as compared with the preepidemic sera varied considerably among different individuals. The maximum increase in the clinical cases was from no fixation at a serum dilution of 1:4 to ++++ fixation at 1:256; among the subclinical infections the maximum increase was from no fixation at 1:4 to ++++ fixation at 1:64. Of the sera of the total of 94 individuals classified as proved cases of influenza A or subclinical infections, 52 percent showed increases in fixation of complement of from zero at 1:4 serum dilution to ++++ at 1:16 and another 17 percent from zero at 1:4 to ++++ at 1:64. Increases in titer of complement-fixing substances tended to be considerably more uniform, therefore, than the increase in neutralization titers found in the sera of these same individuals. Nevertheless, as in the case of the increases in neutralization titers it was observed that the convalescent complement fixation titers of certain individuals' sera were not as high as the preepidemic titers of the sera of other persons who contracted influenza A.

TABLE 12.—*Comparison between complement fixation titers of sera taken 1 year after the epidemic of influenza A and titers of preepidemic sera from the same individuals*

Change in titers of 1-year postepidemic sera as compared to titers of preepidemic sera	Clinical cases, number of individuals	Subclinical infections, number of individuals	Total clinical cases and subclinical infections	
			Number of individuals	Percent
Decreased to original titer ranges	28	34	62	66
Decreased to titer ranges 4 times above ranges of preepidemic sera	12	6	18	19
Decreased to titer ranges 16 times above ranges of preepidemic sera	6	3	9	10
Remained in same titer ranges as convalescent sera	1	4	5	5
Total	47	47	94	100

TABLE 13.—*Comparison of mean complement fixation titers of preepidemic sera, convalescent sera, and sera taken 1 year after the epidemic from the same individuals*

	Clinical cases		Subclinical infections	
	Number of individuals	Mean titers	Number of individuals	Mean titers
Titers of preepidemic sera	59	1:0 6	63	1:0.4
Titers of convalescent sera	59	1:34	63	1:10
Increase in titers of convalescent over preepidemic sera	59	56X	63	25X
Titers of 1-year postepidemic sera	47	1:6	47	1:3
Increase in titers of postepidemic over preepidemic sera	47	10X	47	7X

Data in regard to the rise and fall of complement fixation titers, analogous to those presented in tables 7 and 8 pertaining to the neutralization tests, are summarized in tables 12 and 13. In table 12 it may be noted that, although there was a greater tendency for com-

plement fixation titers to return to their original levels than was observed in the case of the neutralization titers, there still was considerable residual immunity as measured by the complement fixation tests at one year after infection.

A comparison of mean complement fixation titers of the preepidemic, convalescent, and 1-year postepidemic sera as given in table 13 revealed that the mean titers of clinical cases and subclinical infections were essentially the same.

The complement fixation titers of the 1938 and 1939 sera of each of the 668 individuals whose sera showed no significant increase in neutralizing antibodies are compared in table 14. It will be observed that in 95 percent of instances there was no change in complement fixation titer after an interval of one year. In 5 percent of instances the titer declined to the next lower dilution. In considering these percentages, however, it is obvious that a very large number of the sera did not fix complement at a dilution of 1:4 and, therefore, no decrease in titer was demonstrable. Among sera which fixed complement at dilutions of 1:4 and 1:16 the percentages in which decreases were observed were quite large.

TABLE 14.—*Comparison between complement fixation titers of 2 sera taken 1 year apart from each of 668 individuals*

1938 sera		1939 sera		Comparison between individual 1938 and 1939 sera	
Complement fixation titer	Number of individuals	Complement fixation titer	Number of individuals	No change	Decreased to next lower dilution
				Percent	*Percent*
No fixation 1:4	511	*No fixation 1:4*	511	100	0
		Fixation 1:4	0		
		Fixation 1:16	0		
		No fixation 1:4	28		20
Fixation 1:4	133	*Fixation 1:4*	111	80	
		Fixation 1:16	0		
		No fixation 1:4	0		
		Fixation 1:4	7		39
Fixation 1:16	18	*Fixation 1:16*	11	61	
Total	668			95	5

The results of the complement fixation tests done upon the sera taken in 1940 from 117 individuals whose 1938 serum complement fixation titers were determined are summarized in table 15. Here again the tendency of a certain proportion of individuals to lose their complement-fixing antibodies was demonstrated. It is apparent, therefore, that the relative constancy of the level of antibodies in a given individual's serum, as demonstrated by means of the neutralization test, was only partially demonstrable by means of the complement fixation test.

TABLE 15.—*Comparison between complement fixation titers of 2 sera taken 2 years apart from each of 117 individuals*

1938 sera		1940 sera		Comparison between individuals' 1938 and 1940 sera			
Complement fixation titer	Number of individuals	Complement fixation titer	Number of individuals	No change	Increased to next higher dilution	Decreased to next lower dilution	Decreased to second lower dilution
				Percent	*Percent*	*Percent*	*Percent*
No fixation 1:4	79	*No fixation 1:4*	75	95	------	0	0
		Fixation 1:4	4	------	5	------	------
		Fixation 1:16	------	------	------	------	------
		No fixation 1:4	23	------	------	70	0
Fixation 1:4	33	*Fixation 1:4*	10	30	------	------	------
		Fixation 1:16	0	------	0	------	------
		No fixation 1:4	3	------	------	------	60
		Fixation 1:4	0	------	------	0	------
Fixation 1:16	5	*Fixation 1:16*	2	40	0	------	------
Total	117	------	117	74	3	20	3

Among the sera obtained during 1940 there were four in which an increase in complement fixation was noted. In all four cases there was no fixation in the corresponding sera taken in 1938 and 1939, while the 1940 specimens gave only ++ degrees of fixation. These individuals had suffered no illness similar to influenza and there were no significant increases in neutralizing antibodies in the corresponding sera.

DISCUSSION

The results of the investigation which have been presented in this paper were obtained by the prolonged study of a large group of normal individuals. This study was sufficiently comprehensive to permit of certain generalizations regarding antibodies against influenza A virus in the serum of human beings. The evidence which has been obtained indicates that there are marked differences in the titer of neutralizing antibodies against influenza A virus in the sera of different normal individuals. Certain persons may possess neutralization titers 100 or more times higher than certain other individuals and between these two extremes are found human beings with almost any intermediate antibody level. Furthermore, these different individual titer levels remain relatively constant throughout a period of at least 1 year and appear to be quite characteristic for a given person. In the population under study it was found that this was true in the large majority of instances despite the occurrence of an epidemic of proved influenza A in the area during the observation period. The fact that normal human beings differ so widely as regards the titer of neutralizing antibodies against influenza A virus in their sera makes it impossible to establish any critical antibody level which, if exceeded, would have diagnostic significance. This fact also makes it necessary that accurate

and as nearly quantitative methods as possible be used in determining neutralization titers since otherwise erroneous conclusions may result. Finally, it is evident that no diagnostic interpretation can be made on the basis of a given neutralization titer, however high, in a single specimen and that at least two serum specimens, taken before and after an acute upper respiratory disease, are essential if accurate information is to be obtained regarding the presence of infection by influenza A virus.

The opportunity to obtain serum specimens from the population of this community before an epidemic of influenza A occurred made it possible to achieve an important and previously unattained objective. An analysis of the antibody titers of all the preepidemic sera and those obtained from individuals who subsequently contracted either proved influenza A or subclinical infection by influenza A virus indicated that there was a definite relationship between the possession of a low antibody titer and susceptibility to infection by the virus. Although it was found that the great majority of cases of influenza A occurred in individuals who had low levels of antibodies it was also found that a few cases occurred in persons with relatively high titers. Consequently there does not seem to be any critical antibody level which absolutely assures immunity to infection by influenza A virus. Hoyle and Fairbrother (*14*) have suggested that such a critical antibody level does exist. Francis, Magill, Rickard, and Beck (*13*), on the basis of studies on acute and convalescent phase sera from patients with influenza A, also suggested that a critical zone of antibody concentration could be defined. Horsfall, Hahn, and Rickard (*8*) found that the titers of acute phase sera from patients with influenza A were lower than similar sera from other patients with respiratory diseases not due to influenza A virus. Although the majority of persons who contract influenza A normally possess a low titer of antibodies against the virus, some persons are encountered with surprisingly high titers.

This information may prove helpful in the interpretation of the results of attempts to immunize human beings against influenza A virus infection. It has already been shown (*19*, *20*) that specific antibodies may be increased by the parenteral administration of influenza A virus vaccines in human beings. The fact that low antibody levels and susceptibility to infection by the virus are correlated should afford a stimulus for the continuation of studies to determine the actual value of immunization. Intensive studies of a vaccinated population exposed to an epidemic of proved influenza A will be required before the immunizing effectiveness of a vaccine can be accurately assessed.

It has been found that the marked increases in antibody levels which follow either influenza A or subclinical infection by influenza A virus are not permanent and that the increased titers rather rapidly

decrease. Francis, Magill, Rickard, and Beck (*13*) found that convalescent titers diminished by approximately 50 percent in 2½ to 5 months after influenza A. In the present study it was shown that 1 year after the disease antibody levels were only moderately though significantly higher than they were prior to the disease. This fact is also of considerable importance in relation to the possibility of prophylactic vaccination against influenza by influenza A virus since it is hardly to be expected that a vaccine will produce a more prolonged immune response than follows after actual infection by the virus.

The very close correlation which was obtained between significant increases in antibody titer as determined by the neutralization test and by the complement fixation test entirely confirms the results of previous comparative studies (*13, 18*) on these two different techniques. The complement fixation test offers a number of practical advantages over the neutralization test since it requires much less time and fewer laboratory facilities. It can undoubtedly be carried out in almost any laboratory equipped to perform the Wassermann test and its application should make possible the accurate diagnosis of influenza A without which epidemiological investigations of clinical influenza will yield but little information. The results of a large series of complement fixation tests have been recently reported by Martin (*21*).

There appears to be a considerable body of evidence which indicates that the clinical syndrome generally termed influenza does not constitute a single disease entity. The studies of Francis (*1*), Horsfall, Hahn, and Rickard (*8*), and those of Stuart-Harris, Smith, and Andrewes (*2*) all indicate that an exact diagnosis cannot be made upon clinical grounds alone and that one or more etiologically unrelated diseases can simulate influenza A so closely as to be indistinguishable from it. Because of this fact the diagnosis of influenza A must rest upon laboratory evidence. An exact diagnosis should depend upon the isolation of the virus from typical cases and upon the demonstration of a significant increase in antibodies determined by the study of two serum specimens from each patient. It should be emphasized again, however, that an accurate clinical history is an invaluable adjunct to the laboratory studies, particularly since subclinical and entirely asymptomatic infections by the virus can result in increases in antibody titers equally as significant as those encountered in frank cases of the disease.

SUMMARY AND CONCLUSIONS

A comprehensive study of influenza in a representative rural population over a period of 2 years has revealed the following:

1. The proportion of individuals with different neutralizing antibody levels against influenza A virus was determined during a non-

epidemic interval among 1,101 persons from 4 to 85 years of age. Titers varied greatly from one individual to another. The highest mean titer was found in the adolescent age group, while during adult life mean titers remained at a constant level and dropped very considerably in old age. No relationship was demonstrated between neutralization titers and factors such as sex, length of residence in the locality, amount of travel, or past history of clinical influenza.

2. Neutralization titers of persons not infected with influenza A virus remained markedly constant for a period of 1 year. At the end of 2 years this same constancy was still demonstrable among the sera of many individuals but evidence was obtained of a decline in antibodies of some persons who possessed high or very high titers.

3. Complement fixation tests done upon 807 of the same 1,101 sera revealed considerable variation in titers among different individuals but this variation was not as marked as that noted by the neutralization tests. In contrast to the neutralization tests mean complement fixation titers were low in youth and progressively increased to reach their greatest height in late adult life, falling somewhat in old age. As in the case of the neutralization titers no relationship was demonstrated between complement fixing antibodies and sex, length of residence in the locality, amount of travel, or past history of clinical influenza.

4. The degree of constancy of individual complement fixing antibody levels was not as marked as was noted with the neutralization titers. Certain persons maintained the same complement fixing antibody level for a period of 2 years but a large proportion of individuals showed a considerable decline in titers at the end of that period.

5. Some correlation between the titers of neutralizing and complement fixing antibodies in the same sera was demonstrated but this correlation was small.

6. In an epidemic of influenza A occurring several months after the taking of the original blood specimens 59 persons were ill with influenza A, the diagnosis having been confirmed in all instances either by the isolation of influenza A virus or by a significant increase in neutralizing antibodies. A comparison of the neutralization titers of the preepidemic sera of these individuals to the preepidemic titers of the sera of the general population indicated that susceptibility to proved influenza A and the possession of a low titer of neutralizing antibodies were definitely correlated but that the possession of a high titer was not an absolute guarantee of immunity. The complement fixation titers were only partially as good an index of susceptibility to infection as were the neutralization titers.

7. Significant increases in neutralizing antibodies were found in the sera of 63 persons who had been present in the community during the epidemic but who gave no history of having been ill with symp-

toms suggestive of influenza. These cases were classified as "subclinical infections."

8. The titers of the preepidemic sera of the persons who had proved influenza A and of the persons sustaining subclinical infections were almost identical both by the neutralization and complement fixation tests, thus indicating that antibody titers did not alone determine the severity of symptoms caused by infection with influenza A virus.

9. A comparison of mean neutralizing titers of preepidemic, convalescent, and 1-year postepidemic sera revealed that the rise and fall of neutralizing antibodies among proved cases and subclinical infections were likewise almost identical. This in turn indicated that the neutralizing antibody response to infection had little relationship to the severity of symptoms caused by the infection.

10. Great variation among different individuals was noted both in the increase and in the subsequent decrease of neutralizing antibodies after infection. The titers of some persons' sera during convalescence were lower than the titers of the preepidemic sera of other individuals who contracted proved influenza A. After 1 year, the neutralization titers of 19 percent of the individuals in the series had returned to their preepidemic levels. In another 23 percent, however, the convalescent levels were maintained for 1 year and among the remaining individuals the titers fell to varying levels above those of the preepidemic sera. A comparison of the mean titers of the 1-year postepidemic sera of persons who had been infected to the mean titers of preepidemic sera from these same individuals and to the mean titer of the preepidemic sera of the general population demonstrated that at 1 year following an epidemic of influenza A there was a considerable increase in humoral immunity as measured by the neutralization test both among persons who had been ill and among persons who had suffered subclinical infections.

11. Data in regard to the rise and fall of complement fixation titers were very similar to those described for the neutralization titers with the exception that the tendency of individual titers to return to their preepidemic level after a period of 1 year following infection was considerably more pronounced in the case of the complement fixation titers than in the case of the neutralization titers. Nevertheless, a definite residual humoral immunity as measured by the complement fixation test was still demonstrable.

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REFERENCES

(1) Francis, T., Jr.: Am. J. Pub. Health, 27: 211 (1937).
(2) Stuart-Harris, C. H., Smith, W., and Andrewes, C. H.: Lancet, 1: 205 (1940).
(3) Smith, W., Andrewes, C. H., and Laidlaw, P. P.: Lancet, 2: 66 (1933).
(4) Horsfall, F. L., Jr., Lennette, E. H., Rickard, E. R., Andrewes, C. H., Smith, W., and Stuart-Harris, C. H.: Lancet, 2:413 (1940).
(5) Stuart-Harris, C. H., Andrewes, C. H., and Smith, W.: Medical Research Council, Special Report Series, 228 (1938).
(6) Francis, T., Jr.: Ann. Int. Med., 13: 915 (1939).
(7) Francis, T., Jr., Magill, T. P., Beck, M. D., and Rickard, E. R.: J. Am. Med. Assoc., 109: 566 (1937).
(8) Horsfall, F. L., Jr., Hahn, R. G., and Rickard, E. R.: J. Clin. Invest., 19: 379 (1940).
(9) Laidlaw, P. P., Smith W., Andrewes, C. H., and Duncan, G. W.: Brit. J. Exp. Path., 16: 275 (1935).
(10) Francis, T., Jr., and Magill, T. P.: J. Exp. Med., 62: 505 (1935).
(11) Smith, W.: Lancet, 2: 1256 (1936).
(12) Fairbrother, R. W., and Hoyle, L.: J. Path. and Bact., 44: 313 (1937).
(13) Francis, T., Jr., Magill, T. P., Richard, E. R., and Beck, M. D.: Am. J. Pub. Health, 27: 1141 (1937).
(14) Hoyle, L., and Fairbrother, R. W.: Brit. Med. J., 1: 655 (1937).
(15) Francis, T., Jr.: Science, 80: 457 (1934).
(16) Reed, L. J., and Muench, H.: Am. J. Hyg., 27: 493 (1938).
(17) Horsfall, F. L., Jr.: J. Exp. Med., 70: 209 (1939).
(18) Eaton, M. D., and Rickard, E. R.: Application of the complement fixation test to the study of epidemic influenza. Am. J. Hyg. (In press).
(19) Francis, T., Jr., and Magill, T. P.: J. Exp. Med., 65: 251 (1937).
(20) Andrewes, C. H., and Smith, W.: Brit. J. Exp. Path., 18: 43 (1937).
(21) Martin, A. E.: J. Hyg., 40: 104 (1940).

A SANITARY LOG FOR AMERICAN SHIPS

Description and Plan of Operation

By G. C. Sherrard, *Acting Assistant Surgeon, United States Public Health Service*

A clean, rat-free ship is becoming increasingly important, not only for the health, comfort, and safety of passengers and crews but for the protection of visited ports against the importation of disease. In achieving these desirable results there has long been need for keeping a permanent, reliable, and official record of a vessel's sanitary condition. The present article sets forth a plan for a cumulative sanitary log, whereby public health officials, responsible ship's officers, and authorized representatives of owners and operators may obtain useful information.

Under present-day conditions few vessels maintain fixed itineraries for any considerable length of time, but alter their ports of call and trade routes to meet the everchanging conditions of trade and politics. Under these circumstances it is difficult for official agencies to accumulate a continued history of the sanitation, extent of rat infestation, and the special matters of interest essential in safeguarding the health of

passengers and crew and preventing the transmission of disease. The collection of sanitary data in a special log kept on the vessel would make this information available at all times and at all ports.

Sample pages of the proposed sanitary log are shown herewith. These pages face each other in the bound book and refer to the same inspection. It will be noted that the data included are simple in character, referring principally to rat infestation and sanitation, the two subjects of greatest importance from the standpoint of health on vessels.

Under the heading "rat infestation," there are spaces for inserting the estimated number and location of rats, the exterminative measures in effect, data relating to traps, and the recommendations for correcting undesirable conditions. There are also suggestive leads relating to sanitation and recommendations for improvements. Space is provided for the insertion of the important information pertaining to the exemption or deratization certificate, without which no vessel should engage in foreign trade. The remainder of the page is devoted to entries identifying the vessel, its chief officer, and the inspector who represents an official governmental agency.

On the page opposite the basic information just mentioned is a separate sheet on which the chief officer may record his understanding of the inspector's recommendations and the corrective measures to be employed. He may also make his own entries as to rat infestation and sanitation. It is expected that the master of the vessel will review the chief officer's remarks and maintain close contact with the conditions mentioned.

The log book would be approximately 9 inches by 12 inches in size, cloth bound, and would contain approximately 200 pages, 100 of each type. The pages would be numbered consecutively in order to discourage the removal, alteration, or destruction of reports. It is estimated that a log book of good quality can be supplied for $1.50, the cost to be borne by the vessels or shipping interests concerned. The record might easily serve for periods varying from 5 to 20 years, depending upon the extent to which the log book is used, this in turn depending upon the length of voyages, ports of call, and the frequency of inspections.

It is contemplated that the care and responsibility of the log book will rest with the chief officer, under the immediate supervision of the master. This delegation is made because many vessels are inspected at their docks, during a period when the masters are absent on business and records are not available. Then, too, it is a common practice of many shipping companies to charge the chief officers with the duty of maintaining vessels in a sanitary condition.

It is believed that both Federal health officials and shipping interests will derive substantial benefits from the application of this plan. Some of these benefits may be listed as follows:

1. In a comparatively short period of time following the inauguration of the plan each vessel would have on board an official and authentic record of its sanitary history readily accessible to quarantine officers and sanitary inspectors at each port of call. The sequence and continuity of the recorded data would greatly facilitate both quarantine and sanitary inspection.

2. The plan would afford a means through which a continuity of effort could be established between various quarantine stations in the matter of rat control and sanitation, and avoid conflicting recommendations as to the method of applying specific corrective measures.

3. The availability to owners and their representatives of the information contained in the sanitary log should be of considerable value in enabling them to determine and apply needed corrective measures, and afford a criterion as to the efficiency of those persons charged with the maintenance of proper sanitation.

4. Information as to the time, place, and date of issuing deratization or deratization exemption certificates will be recorded and made available to those concerned, thereby facilitating the application for renewal of certificates at the proper time.

5. During the quarantine inspection of vessels at ports where trained sanitary inspectors are not immediately available, the quarantine officer will be able to obtain a sanitary and rat-infestation history which will assist in determining what, if any, quarantine treatment is required.

6. The plan will stimulate interest, present a focal point of contact, and assist in coordinating the efforts of all persons and agencies concerned in promoting the proper sanitation of ships.

Arrangements have already been made in the port of New York to make a practical test of the sanitary log on the vessels of two large shipping lines. Moreover, the plan has been explained to a representative group of ships' operators without substantial objection to the principle or its details. Because of the obvious simplicity and low cost of the log book the rapid extension of the plan is contemplated to other American vessels. Thereafter it is hoped that the results will be sufficiently gratifying to justify the world-wide adoption of the plan through international conventions.

In conclusion, the writer desires to acknowledge his grateful appreciation to Dr. Robert Olesen, Chief Quarantine Officer at the port of New York, for his leadership in the presentation of the plan to the shipping interests at the port of New York and for many helpful suggestions given during the preparation of this article.

Sanitary Log

Page No. 1

-------- S/S ------------------------ Chief Officer ----------------------

Inspected at port of ------------------------------ Date ----------------

RAT INFESTATION: Number estimated ---------- Location --------------

----

Eliminative measures in force: ---------------------------- ---------------

----

No. of traps set: -------------- No. on board: --------------- Kind: ------

RECOMMENDATIONS: ---

SANITATION: General condition ---------- Insanitary conditions ----------

----

RECOMMENDATIONS: ---

Place and date of last exemption or deratization certificate ------------------

----

REMARKS: ---

NOTE.—Entries to be made by Sanitary Inspectors only.

Inspector ------------------------------

Title --------------------------------

Chief Officer's Entries

Page No 1a

This is to certify that I have read the above entries.

---------------------------------------,

MASTER.

NOTE.—Entries should be dated and signed by the Chief Officer.

PNEUMONIC PLAGUE IN ECUADOR DURING 1939

By John R. Murdock, *Surgeon, United States Public Health Service, Traveling Representative, Pan American Sanitary Bureau*

During 1939, three outbreaks of pneumonic plague occurred in Ecuador, two in the Province of Chimborazo and one in the Province of Loja. The first outbreak occurred during the months of January and February in Riobamba, causing 17 deaths, the second during the month of April in Columbe, with 14 deaths, both in the Province of Chimborazo. The third outbreak, which occurred during the month of September, started in Cofradia, near Catacocha, and extended to the city of Loja in the Province of Loja. It caused at least 7 deaths.

In the first two outbreaks, no definite proof was available that patients with bubonic plague had developed secondary pneumonia, but in Loja the history was definite; there the first primary case of plague pneumonia was diagnosed and followed through. The author worked in the three outbreaks and assisted in their control.

Bubonic plague has been present in Ecuador since its introduction in 1908. It has spread from the ports to the mountain districts along the rivers, railroads, highways, and mule trails. The three common types of rats, Norway (*Rattus norvegicus*), Alexandrinus (*Rattus alexandrinus*), and *Rattus rattus*, have been the responsible hosts, and from them the disease has spread to the domestic guinea pigs, wild rats (ratas de campo), rabbits (conejos), squirrels (ardillas), and probably to other rodents. A few scattered cases of pneumonic plague have been recorded in Ecuador, but no outbreaks such as those reported here had previously been recorded.

RIOBAMBA OUTBREAK

During the early part of January 1939, a few cases of bubonic plague were reported from the endemic zone in the Province of Chimborazo. On January 17, a woman who had been transferred from Tixan to the hospital in Alausi died after 2 days' illness with a disease diagnosed as pneumonia. On January 20 the husband of this woman was transferred from Tixan to the hospital in Riobamba. He had a high fever and a generalized rash, and died on January 21 of what was diagnosed as typhoid fever. During the 2 days in the hospital, the patient had occupied a corner bed in a small 7-bed ward, all beds of which were occupied. The distance from the head of this patient's bed to the heads of the two nearest patients' beds were 10 and 12 feet, respectively. No other patients in the ward contracted the disease. The doctor and nurses also escaped, but a friend who visited the patient and sat on his bed for about 30 minutes during the last day of his illness became sick on January 24.

This friend had been confined to the hospital with an attack of malaria since January 16 and was to have been discharged on January 24. However, about 5 a. m. on January 24 he developed a chill followed by a fever of 39.4° C., marked prostration, and later a cough and expectoration which became blood stained before his death on January 26. The diagnosis was pneumonia.

This patient had occupied a bed in an overcrowded 17-bed ward, all beds of which were occupied. There were patients in the beds on each side of his bed not more than 4 feet away, but no other patients in the ward developed the disease. The doctor escaped, but the Sister who spent the last 4 hours in close contact with the patient became ill on January 29 with a chill followed by fever, headache, generalized pains, and a cough, which later became productive, with blood-stained sputum. She died on January 31, the diagnosis being pneumonia. This Sister occupied a room with two other Sisters and was treated by Dr. Alfonso Villagomez.

On February 3, two more Sisters in the Alausi hospital and the Mother Superior of the Children's Hospital in Riobamba became ill, all developing the same group of symptoms—chills followed by headache, fever, generalized pains, and prostration. After about 24 hours the characteristic, soft, easy cough commenced, with little expectoration, of a mucoid character at first, later flecked with pus, and finally blood stained. One of these Sisters died on February 5, the Mother Superior on the 6th in the Children's Hospital, and the other Sister died on the 7th.

Dr. Alfonso Villagomez, who was treating the Sisters, became suspicious of the disease, and, working with the health officer, made smears of the sputum of one of the Sisters, stained and examined them, and made a diagnosis of plague pneumonia. Another Sister had become ill on February 4, and still another with similar symptoms on February 5. Both died on February 7.

On February 8, the Chief of the Antiplague Service and the author arrived at Riobamba about 4 p. m. and the foregoing history was secured from the records of several of the hospital staff doctors who had cared for the patients. The smears stained with methylene blue were examined, and from them, and from the history of nine deaths in rapid succession, and epidemiological and clinical evidence, the diagnosis of plague pneumonia was made.

As there was no diagnostic material then available, and as the diagnosis had not been confirmed by guinea pig inoculation, on February 9 the cadaver of the last Sister to die was exhumed, and a section of the third rib removed. From the medullary portion smears were made and 3 guinea pigs were inoculated, two by scarification and one by the subcutaneous method.

It was learned that no precautions had been taken by the doctors, nurses, or helpers to protect them from the disease, that the sick Sisters had been treated in their quarters, and that no quarantine or isolation had been instituted. Arrangement was made for the isolation of the new cases and the handling of contacts. Head masks (made like sacks, which could be pulled down over the head and tied about the neck, and with holes for the eyes covered with isinglass), coveralls, and rubber gloves were obtained to protect the doctors, nurses, and orderlies. The hospital was placed under strict quarantine by armed police, and no one was permitted to enter or leave except the doctors.

From February 9 to 14, 9 other cases of pneumonic plague, with 8 deaths, occurred in Riobamba, one of the victims being Doctor Villagomez.

The sputums of the patients who became ill after February 8 were examined microscopically and found in most cases to be almost pure cultures of *Pasteurella pestis*. The guinea pig inoculated subcutaneously on February 9 died on the 12th, and the two inoculated by scarification died on the 13th, all with typical macroscopic and microscopic findings of plague.

Although 2 cases of plague pneumonia in Riobamba developed the disease outside of the hospital, no secondary cases occurred from contact with them. Doctor Villagomez, who became ill in his home, was transferred to the isolation ward in the hospital, where he was treated; and the Mother Superior of the Children's Hospital, who contracted her illness while living at the Children's Hospital, was treated until her death at the hospital. It was not suspected at the time that she had plague pneumonia.

COLUMBE OUTBREAK

Columbe is a small town on the railroad which connects Quito with Guayaquil, situated in the mountainous region of Chimborazo about 35 kilometers from Riobamba. Its elevation is 2,140 meters above sea level.

During the first 3 months of 1939, numerous outbreaks of bubonic plague had been reported in the towns surrounding Columbe. Dr. Santos Miranda had been sent to the region, with headquarters in Alausi, to investigate and take measures to control the disease.

About April 15, a number of Indians living and working on a hacienda 2 kilometers from Columbe, died. A young student of medicine spending his vacation in Columbe learned of the deaths and went out to the hacienda to investigate. He found two patients with symptoms of pneumonia, and, knowing the history of the Riobamba outbreak, he examined the lungs of the patients and made smears of the sputum for examination. The following day he was said to have found the plague

bacillus. Two days later he had a chill followed by fever, headache, generalized pains, cough, and blood-stained expectoration. He died on April 18 in the convent in Columbe.

Doctor Miranda examined the young medical student, made smears of and inoculated a guinea pig with the sputum. The smears contained *Pasteurella pestis* and the pig showed definite evidence of plague. With this confirmatory evidence of plague pneumonia, Doctor Miranda informed the Director of Health on April 24 that plague pneumonia had broken out in Columbe.

On April 25, the Assistant Director of Health, Dr. Anthony Donovan, Traveling Representative of the Pan American Sanitary Bureau, and the author arrived at Columbe about 2 p. m. Smears from the spleen of the guinea pig, which died following inoculation with the sputum of the student, were examined, and a confirmatory diagnosis of plague was made. Then smears made from the sputum of the medical student and from an Indian who had died were examined and found positive for the *Pasteurella pestis*.

All people living in the convent were found in good health, and as the room occupied by the student had been fumigated and cleaned, and as 7 days had elapsed since his death, it was believed that there was no further danger from that source.

Then the scattered Indian village was visited and 3 suspected cases were examined. One, an Indian male, was found to have symptoms of pneumonia, and the soft, easy cough and sputum, showing the cohesive stringy form and the rust color characteristic of plague pneumonia, provided a tentative diagnosis of pneumonic plague. Smears from the sputum were prepared for examination, and a guinea pig was inoculated with it by scarification. The patient had a temperature of 39.4° C. and a pulse rate of 132. The other two suspects, a woman and her small child in a nearby hut, were considered negative.

A large implement house of several rooms, located near the village, was converted into a hospital for isolating the patient from the mother and child and quarantining all other contacts.

As the huts previously occupied by Indian patients were found to be of cheap construction and difficult to fumigate, orders were issued for them to be burned by the local authorities.

The methods employed broke the chain of contact and the epidemic terminated. Altogether 14 patients contracted the disease, with 100 percent mortality.

THE LOJA OUTBREAK

From May to August 31, 1939, there were 139 known cases of bubonic plague in the mountainous Province of Loja in the southern part of Ecuador, bordering on Peru. One of the sections most

affected was the region around the 300-year-old city of Catacocha. This Province, which is noted for its fine climate, good crops, and mineral wealth, is backward in its means of communication with the outside world. There are no railroads. A few highways extend out from the city of Loja, but the most important method of transportation, which has been used since the founding of Loja in 1549, is by muleback. Some of the mule trails are fair in the summer months, while others are fit only for goats. Many become impassable during the winter months.

On September 6 a commission consisting of the new Chief of the Antiplague Service, a sanitary inspector, and the author arrived in the city of Loja. The streets of the old city were crowded with all types of people who live in the Province and who had gathered for the annual 3-day fair. People from all parts of Ecuador go to Loja for this occasion, some to sell their cattle or merchandise, others to purchase.

Loja and the adjacent region had been free from plague for several years; but with many cases occurring in the Province, the danger of the congregation of so many people was recognized by the commission. After a discussion of the entire plague problem with the Sanitary Delegate, a trip through the Province was made.

The commission arrived at Catacocha on September 8, accompanied on the latter part of the trip by the local health physician, who stated that many cases of bubonic plague had occurred in the Casanga Valley below Catacocha. Guided by the local physician the commission visited Cofradia and Colanga in the Casanga Valley on September 9.

The first house visited was one occupied by the widow and son of Ramon Pineda, who had died on September 5 after 3 days' illness. The unconfirmed diagnosis was given as bubonic plague. He had had a bubo in the right axillary region.

The mother was ill, with a fever of 39.6° C., a pulse rate of 120, and a respiratory rate of 64. She complained of headache and exhaustion. She stated that she had had a chill early on the morning of September 8, followed by fever and headache, but that she had no other pains. No buboes were found. The lungs and heart were examined. The soft, easy cough which resembled the cough of the pneumonic plague patients in Riobamba and Columbe aroused suspicion. A specimen of sputum obtained from the patient showed the adhesive, stringy characteristics of plague sputum. When the end of a match was placed in it and then withdrawn slowly, a fine filament about 6 inches long connected the match to the sputum in the cup. This sputum was not blood-tinged but was sprinkled with small flecks of pus. Smears were made, to be examined later by microscope.

The son stated that his father had developed a chill on September 2, followed by headache, fever, pains in the back, and a sore swelling under his right arm. He said the swelling became larger and more painful, and that his father became very weak. He stated that, on the afternoon of September 4, his father developed a cough like that of his mother and that his sputum was red before he died. This story confirmed the provisional diagnosis of plague pneumonia of the mother, and indicated that the father, during the course of a bubonic form of plague, had died with a complication of plague pneumonia and had infected his wife.

From the son a list of the persons who had visited the house during the illness and "wake" of the father was obtained. After the Pineda house had been cleaned and the walls, floors, and household furnishings washed with cresol solution, the homes of neighbors in Cofradia, and especially those who had been in contact with Pineda, were visited, and later other cases were discovered.

A total of 7 deaths attributable to pneumonic plague occurred up to September 18, in persons who had been in contact with Ramon Pineda or with cases originating in such contact. The diagnosis was confirmed by sputum examination and guinea pig inoculation.

Instructions were given regarding the prevention of further spread of the disease, and plans to combat the epidemic and to provide for future protection were instituted, supported financially by the Government at Quito. When the writer left Loja on September 20, it was believed that future cases arising from this outbreak were unlikely.

CONCLUSIONS

These three outbreaks again emphasize the fact that pneumonic plague is a highly contagious infection with a high mortality rate that may at times approximate 100 percent.

The best methods to control the outbreaks and break the chain of contact are:

1. To isolate rigidly the infected patients when the first suspicious symptoms are recognized.
2. To quarantine all persons who have been in direct contact with the infected person or persons (under armed guards, if necessary).
3. To protect nurses and doctors in attendance by suitable head masks, gowns, and rubber gloves.
4. The careful disinfection and fumigation of quarters previously occupied by pneumonic plague patients.
5. House-to-house inspection of infected sectors, with temperature taken twice daily and isolation of all who show temperature regardless of cause.

It is the author's opinion that outbreaks of pneumonic plague almost always result from cases of bubonic plague that develop a secondary pneumonia. This was the case in the Loja outbreak.

When pneumonic plague cases are discovered, it is not always possible to establish the connection between the first pneumonic infection and the bubonic cases that produced it.

The only way the author can explain the fact that no secondary cases occurred among the ward patients in Riobamba is that close intimate contact whereby the person breathes the exhaled air of the patient is necessary, and that when a sufficient distance separates the patient from other persons the soft, easy cough of the pneumonic plague patient is not sufficiently forceful to propel the infective *Pasteurella* more than a few feet.

Doctors and health officers in any endemic plague region should be on their guard and be suspicious of all patients with pneumonic symptoms and especially of those who die in less than 4 days. They should also remember that patients with pneumonic plague may cough very little, that the cough is soft and easy, that the sputum in the early stages may contain small flecks of pus and become blood stained only in the last stages of disease, but that at all times it is very cohesive and forms long, fine filaments when a portion of sputum is separated from the mass specimen.

PERIOD OF ANTIBODY DEVELOPMENT TO LYMPHOCYTIC CHORIOMENINGITIS IN MICE[1]

By Robert A. Lyon, M. D., *Washington, D. C.*

A considerable number of persons in many localities harbor the antibodies of lymphocytic choriomeningitis in their blood, which indicates that infection with the virus of this disease is not rare (*1, 2*). An incapacitating illness such as usually occurs in the meningeal type of the disease, however, is recalled by few of these immune individuals. Hence, the acquisition of this protection probably resulted from a somatic, nonmeningeal infection with this virus. The practical importance of the disease, however, results from central nervous system invasion by the virus which may be associated with marked symptoms and even neurological sequellae (*3*). In connection with the study of methods of experimental immunization of mice, it was considered of interest to determine the time necessary for development of immunity in this species.

The purpose of the investigation here reported is, therefore, to determine the duration of the immunization period of lymphocytic

[1] Work performed at National Institute of Health, Washington, D. C.

choriomeningitis virus in mice. (Daily observations on inoculated animals were made throughout the progress of the study.)

METHOD

Graded concentrations of virus-infected mouse brain emulsion diluted to 10^{-2}, 10^{-3}, and 10^{-4} were injected subcutaneously into groups of mice on successive days for a week; each group of mice received but one inoculation. One cubic centimeter quantities of emulsion were employed. Half of the animals of each group were inoculated in the morning and half in the afternoon, in order to determine the time of onset of the immunity with greater precision. Two separate experiments were carried out (see table 1).

Since preliminary tests indicated that immunization occurred within a week, on the seventh day after vaccination of the first group of mice in each of the two tests, all groups were tested for immunity by intracerebral inoculation with 0.03 cc. of a 10^{-2} dilution of lymphocytic choriomeningitis infected mouse brain emulsion. Normal mouse brain inoculated into mice induced no evidence of protection.

RESULTS

From table 1 it is apparent that immunity develops in mice prior to the fifth day following subcutaneous inoculation with the living choriomeningitis virus. There is a slight difference in the apparent rate at which immunization proceeded in the two experiments reported, possibly to be explained by variation in the quantity of virus employed for immunization or by variation in the intracerebrally inoculated test dose employed in the two experiments. In the initial trial an increase in survivors from 16 percent on the third to 98 percent on the fifth day is observed.

TABLE 1.—*Period of immunization*

Intracerebral inoculation, days after immunizing injection	Number inoculated intracerebrally (0 03 cc 10^{-2} suspension)	Number of survivals (immunes)	Percent of survivals (immunes)	Intracerebral inoculation, days after immunizing injection	Number inoculated intracerebrally (0 03 cc 10^{-2} suspension)	Number of survivals (immunes)	Percent of survivals (immunes)
Experiment 1:				Experiment 2			
2	57	3	5	3	40	17	42
3	110	27	25	4	38	33	87
4	111	79	72	5	40	37	93
5	53	52	98	6	40	40	100
6	105	102	97	7	38	37	98
7	107	106	99				

However, in the second experiment the survivors increased from 42 percent on the third day through 87 percent on the fourth day to

93 percent on the fifth. In all instances full immunity was present after the fifth day.

DISCUSSION

In accord with other workers, it was found that subcutaneous administration of potent lymphocytic choriomeningitis virus in mice suffices to establish immunity such that the animal survives intracerebral inoculation of the same virus strain. Since so few animals died during the test period when vaccinated on the fifth, sixth, or seventh day prior to intracerebral inoculation and most are protected after the fourth day, it is evident that 96 to 120 hours are required to immunize mice to active lymphocytic choriomeningitis virus by subcutaneous inoculation, using the method described.

SUMMARY

A period of 5 days is required for the development in white mice of immunity by subcutaneous inoculation of lymphocytic choriomeningitis virus, as tested by intracerebral inoculation.

REFERENCES

(*1*) Dickens, Paul F., and Armstrong, Charles: Benign lymphocytic choriomeningitis (acute aseptic meningitis). A new disease entity. U. S. Naval Med. Bull., **30**:362 (July 1932).
(*2*) Wooley, Jerald G., Armstrong, Charles, and Onstott, Robert H.: The occurrence in the sera of man and monkeys of protective antibodies against the virus of lymphocytic choriomeningitis as determined by the serum-virus protection test in mice. Pub. Health Rep., **52**:1105 (August 13, 1937).
(*3*) Findlay, G. M., Alcock, N. S., and Stern, R. O.: Virus etiology of one form of lymphocytic meningitis. Lancet, **230**:650 (1936).

LOBAR PNEUMONIA*

General Statement.

Although information concerning pneumonia has been rapidly and steadily accumulating, only recently (1938) has this disease dropped from third to fifth place among the principal causes of death in the United States. The prompt and correct employment of suitable methods of treatment has influenced favorably the outcome of this important and dreaded disease. The death rate from pneumonia has declined about one-third since 1936.

Such advances in the management and treatment of pneumonia, however, have had little effect upon reducing the number of cases developing each year. Preliminary reports of recent studies indicate that in the not too distant future preventive measures may be developed to combat this malady.

*This material is available in leaflet form and a limited number of copies may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

Occurrence.

The condition is observed at all ages, though more frequently in early and middle adult life. Males are attacked twice as commonly as females.

Pneumonia is chiefly a disease of the winter months. At this time of the year there is a greater prevalence of mild infections of the respiratory tract; there is more exposure and chilling of the body and a greater tendency to crowding of people in closed warm spaces. These factors are believed to influence the development of the illness.

Method of Spread.

Pneumonia is mildly contagious and may be acquired by contact with a patient suffering with the disease or with a healthy carrier. A carrier is a healthy person who harbors the pneumonia germs in the secretions of the nose and throat.

The germs are spread by the patient into the air in droplets of saliva or sputum while coughing or talking. They may also be transferred by eating utensils used by the sick.

Early Signs of Pneumonia.

The disease usually begins suddenly with a chill. Fever rises rapidly, often reaching 104° within a few hours. After 24 hours, cough develops and the patient takes short, jerky breaths because of pain associated with movement of the lungs.

Course of Disease.

In favorable cases a sudden striking improvement is noted after 4 to 10 days. This is called the "crisis," during which time the temperature drops rapidly, profuse sweating occurs, and the most distressing symptoms disappear. The early use of adequate doses of serum has shortened this period.

In some cases, the improvement is more gradual, in which case the term "lysis" is applied.

Diagnosis.

A competent physician usually has little difficulty in recognizing this disease clinically. It is necessary to determine the type of pneumonia present in order to secure favorable results with serum treatment. This is readily accomplished by an examination of the sputum.

The use of the X-ray film has been of great value in demonstrating the extent of involvement of the lung as well as its progress.

Treatment.

The importance of placing the patient promptly under the care of a competent physician cannot be overemphasized. When used early enough in the course of the disease, serum for type I pneumonia has reduced the death rate of this type to 5 or 6 percent as compared

to a control of 25 to 30 percent. Whereas the results obtained with serums of other types have not been as striking, nevertheless a significant reduction has been observed to justify their continued use.

In recent years the employment of sulfapyridine or sulfathiazole has affected favorably the outcome of pneumonia. The action of these drugs is more dramatic in the pneumonias caused by the streptococcus group of germs. With the use of both of these measures, singly or combined (serum and these sulfanilamide derivatives), a further reduction in the number of deaths from pneumonia is anticipated.

Prevention.

1. Isolate the patient in order to prevent the spread of germs to other members of the household. Investigations have demonstrated that the number of healthy carriers increases during the pneumonia season.
2. Maintain good general bodily health and resistance by—
   - (a) Obtaining sufficient rest and sleep.
   - (b) Eating adequate amounts of the proper foods.
   - (c) Avoiding overcrowding.
   - (d) Exercising regularly in the open air.
3. Avoid contact with cases of pneumonia.
4. Secure prompt medical attention for all respiratory infections.
5. Wear clothing suitable to weather conditions.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT. CONSULT YOUR DOCTOR

COUNTY HEALTH DEPARTMENT ESTABLISHES MENTAL HYGIENE UNIT

What is believed to be the first mental hygiene unit in a local health department was established October 30, 1940, when the Suffolk County, N. Y., Board of Supervisors placed $17,525 in the budget of the Suffolk County Department of Health for the establishment of a division of mental hygiene. It is hoped that this unit will be functioning by January 1, 1941.

The personnel will comprise one psychiatrist, one psychologist, two psychiatric social workers, and a clerk.

The division will in no wise replace the clinics carried on by the State department of mental hygiene, which are devoted chiefly to the problems of school children and to the follow-up of their own parole cases. It will supplement this program by concentrating on the mental problems arising out of physical conditions among those

families served by the health department, the probation department, the children's court, the department of public welfare, and the board of child welfare.

COURT DECISION ON PUBLIC HEALTH

State narcotic drug law construed.—(Louisiana Supreme Court; *State* v. *Martin*, 192 So.694; decided November 27, 1939.) The defendant appealed from a conviction of unlawfully possessing and having under his control a narcotic drug in violation of the State uniform narcotic drug act. One of his contentions before the Louisiana Supreme Court was that the verdict was not responsive to the provisions of the narcotic drug statute in that the statute affected only a designated class of persons in which he was not included. In other words he sought to limit the law's application to those persons who, by its terms, prescribe, dispense, deal in, and distribute narcotic drugs, under which limitation the defendant, as a mere possessor of a drug, would not be amenable to the law.

In sustaining the conviction the supreme court pointed out that, in addition to authorizing certain specified persons, such as persons in charge of a hospital or laboratory, manufacturers, wholesalers, physicians, etc., to possess or control narcotic drugs, the statute also made provision for the proper acquisition, and resultant legal possession, of a narcotic drug by an ordinary individual and penalized possession obtained in other than the prescribed manner. The defendant relied considerably upon a United States Supreme Court case, but the Louisiana court said "We find nothing in the opinion of the court interpreting the Federal act involved in the Jin Fuey Moy case requiring us to restrict the application of the State statute to the prescriber, seller, dispenser, dealer, or distributor of narcotic drugs."

DEATHS DURING WEEK ENDED NOVEMBER 9, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 9, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	7,984	7,707
Average for 3 prior years	7,745	
Total deaths, first 45 weeks of year	376,895	370,242
Deaths under 1 year of age	512	431
Average for 3 prior years	457	
Deaths under 1 year of age, first 45 weeks of year	22,582	22,339
Data from industrial insurance companies:		
Policies in force	64,863,128	66,569,616
Number of death claims	9,323	9,407
Death claims per 1,000 policies in force, annual rate	7.5	7.4
Death claims per 1,000 policies, first 45 weeks of year, annual rate	9.6	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 16, 1940

Summary

The incidence of each of the nine communicable diseases included in the weekly telegraphic reports, with the exception of meningococcus meningitis and poliomyelitis, increased during the current week, but no significantly unusual prevalence was recorded for any of these diseases. The figures for only three—measles, poliomyelitis, and whooping cough—were above the 1935–39 median expectancy, and the cumulative totals for this year to date (46 weeks) are above the 5-year medians for only influenza and poliomyelitis.

A total of 1,180 cases of influenza was reported for the current week, as compared with 787 for the preceding week, the principal increases being in Virginia (from 74 to 148 cases), South Carolina (from 144 to 306 cases), and California (from 22 to 138 cases).

Of 39 cases of smallpox, 10 cases each were reported in Tennessee and Washington State, and 8 cases in Illinois. The highest incidence of whooping cough is apparently in the Middle Atlantic and East North Central States. Three cases of undulant fever were reported in Connecticut and 1 case each in Maryland and Mississippi. Of 51 cases of endemic typhus fever, 13 were reported in Georgia, 10 in Alabama, and 11 in Texas.

For the current week the Bureau of the Census reports 8,103 deaths in 88 major cities of the United States, as compared with 7,978 for the preceding week and with a 3-year (1937–39) average of 8,226 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended November 16, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39
	Nov. 16, 1940	Nov. 18, 1939		Nov. 16, 1940	Nov. 18, 1939		Nov. 16, 1940	Nov. 18, 1939		Nov. 16, 1940	Nov. 18, 1939	
NEW ENG.												
Maine	1	2	2	------	1	1	200	19	28	0	0	0
New Hampshire	0	0	0	------	------	------	4	4	3	0	0	0
Vermont	0	0	0	------	------	------	9	41	41	0	0	0
Massachusetts	5	9	8	------	------	------	219	275	103	3	0	2
Rhode Island	0	0	0	------	------	------	2	58	19	0	0	0
Connecticut	0	0	3	1	------	3	2	45	45	0	0	0
MID. ATL.												
New York	17	19	24	[1] 11	[1] 11	[1] 11	357	149	149	2	0	3
New Jersey	12	27	17	------	16	9	186	17	18	2	0	1
Pennsylvania	18	69	54	------	------	------	812	39	66	0	4	3
E. NO. CEN.												
Ohio	18	48	48	18	34	32	38	27	27	1	0	4
Indiana	11	21	32	4	1	13	22	27	18	0	0	1
Illinois	18	39	44	8	10	19	251	28	28	0	4	4
Michigan [2]	9	6	29	11	------	1	368	160	54	3	0	1
Wisconsin	1	0	2	26	28	33	248	35	42	0	0	0
W. NO. CEN.												
Minnesota	4	0	7	1	------	1	28	87	45	0	0	1
Iowa	7	3	4	1	------	3	41	17	5	0	0	1
Missouri	13	15	32	1	------	41	2	9	9	2	1	1
North Dakota	3	1	1	------	5	5	4	2	5	0	0	0
South Dakota	1	1	2	1	3	------	1	5	4	0	0	0
Nebraska	0	2	5	------	------	------	2	2	2	0	0	0
Kansas	5	4	14	3	4	5	9	68	11	0	0	0
SO. ATL.												
Delaware	0	1	1	------	------	------	0	0	2	0	0	0
Maryland [2]	2	7	21	1	7	5	6	2	8	0	0	0
Dist. of Col.	1	2	11	------	------	------	1	1	1	0	0	3
Virginia [3]	29	68	68	148	89	------	55	11	26	2	2	3
West Virginia [3]	12	15	31	7	13	20	24	2	17	0	0	1
North Carolina [3]	49	117	117	3	5	7	24	103	103	0	2	2
South Carolina [3]	18	24	16	306	478	284	9	5	5	0	0	1
Georgia [3]	31	29	29	33	118	------	12	9	0	0	0	0
Florida	11	8	12	2	3	3	3	4	4	0	1	1
E. SO. CEN.												
Kentucky	11	16	29	10	64	15	73	4	7	0	1	5
Tennessee [3]	13	34	40	39	38	38	25	9	6	0	0	3
Alabama [3]	27	54	44	43	185	55	23	4	6	4	2	4
Mississippi [2] [3]	23	18	14	------	------	------	------	------	------	0	0	0
W. SO. CEN.												
Arkansas	12	23	21	24	54	28	2	3	3	0	1	1
Louisiana [3]	10	9	18	9	10	6	1	1	8	0	1	1
Oklahoma	29	15	25	23	34	42	2	5	4	0	0	0
Texas [3]	36	46	61	229	247	220	41	14	14	0	1	1
MOUNTAIN												
Montana	6	1	1	------	132	3	0	22	22	0	0	0
Idaho	0	0	0	------	------	1	0	1	7	0	2	0
Wyoming	1	1	0	------	------	------	3	9	4	0	0	0
Colorado	5	5	9	4	13	------	22	46	11	0	0	0
New Mexico	0	1	6	1	1	------	11	7	7	0	1	0
Arizona	5	7	5	56	63	58	39	3	2	0	0	9
Utah [2]	0	0	0	6	5	------	3	87	13	0	0	0
Nevada	0	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	6	1	1	------	------	------	6	263	30	0	1	0
Oregon	4	2	2	12	18	20	14	19	16	0	1	1
California [3]	18	32	49	138	21	33	27	162	140	0	3	1
Total	502	802	980	1,180	1,711	970	3,231	1,910	1,910	19	28	63
46 weeks	13,575	20,295	23,949	177,864	160,713	147,875	245,260	350,527	350,527	1,449	1,758	4,930

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 16, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Nov. 16, 1940	Nov. 18, 1939		Nov. 16, 1940	Nov. 18, 1939		Nov. 16, 1940	Nov. 18, 1939		Nov. 16, 1940	Nov. 18, 1939	
NEW ENG.												
Maine	0	0	0	3	8	12	0	0	0	0	2	1
New Hampshire	0	0	0	9	0	7	0	0	0	0	0	0
Vermont	0	0	0	2	0	7	0	0	0	0	0	1
Massachusetts	1	2	2	123	82	105	0	0	0	1	1	1
Rhode Island	0	0	0	2	3	12	0	0	0	1	0	1
Connecticut	0	0	0	15	35	38	0	0	0	0	2	2
MID. ATL.												
New York	6	18	7	187	236	271	0	0	0	22	5	8
New Jersey	0	5	2	76	103	85	0	0	0	4	2	4
Pennsylvania	8	15	4	189	408	340	0	0	0	15	10	19
E. NO. CEN.												
Ohio	23	7	0	210	325	270	0	2	1	11	10	11
Indiana	9	1	1	73	167	161	0	1	2	1	3	1
Illinois	21	5	4	250	300	300	8	1	2	2	8	13
Michigan [2]	21	6	5	156	287	287	3	10	4	3	2	4
Wisconsin	11	5	1	110	117	181	1	3	2	3	0	1
W. NO. CEN.												
Minnesota	11	4	2	64	101	121	2	13	4	1	0	1
Iowa	6	12	2	62	52	70	1	16	6	0	2	3
Missouri	3	0	2	62	68	114	0	2	4	1	12	5
North Dakota	0	0	0	8	35	43	1	0	10	1	0	2
South Dakota	0	1	1	13	20	34	0	2	2	0	0	1
Nebraska	2	3	1	17	17	33	0	0	0	0	2	1
Kansas	7	0	0	53	91	118	0	1	2	4	3	3
SO. ATL.												
Delaware	0	0	0	7	9	9	0	0	0	0	2	2
Maryland [2]	1	2	1	32	45	71	0	0	0	0	4	5
Dist. of Col	0	3	0	10	6	10	0	0	0	1	2	1
Virginia [3]	12	0	1	86	54	54	0	0	0	10	8	7
West Virginia [2]	19	7	0	49	81	86	0	0	0	3	7	7
North Carolina [3]	2	3	1	89	141	72	0	1	0	2	1	3
South Carolina [3]	0	1	1	23	31	12	0	0	0	0	14	3
Georgia [3]	1	0	1	43	42	38	0	1	0	9	10	10
Florida	1	0	1	2	16	11	0	0	0	8	3	3
E. SO. CEN.												
Kentucky	3	9	3	48	86	69	0	0	0	13	5	12
Tennessee [3]	4	1	1	117	71	71	10	0	1	8	1	5
Alabama [3]	0	3	2	42	54	27	0	1	0	7	2	5
Mississippi [2 3]	2	2	2	15	17	13	0	0	0	4	3	3
W. SO. CEN.												
Arkansas	0	2	2	13	21	20	1	0	0	7	10	10
Louisiana [3]	3	0	1	10	14	17	0	0	0	3	7	11
Oklahoma	3	1	1	29	23	23	1	2	2	5	3	10
Texas [3]	3	6	2	45	51	66	5	0	0	9	14	27
MOUNTAIN												
Montana	0	0	0	10	34	34	0	0	8	0	1	4
Idaho	2	2	0	7	6	21	0	1	1	0	2	2
Wyoming	6	0	0	8	5	11	0	1	1	0	0	0
Colorado	1	0	4	24	43	42	0	1	1	2	2	1
New Mexico	0	3	0	5	11	20	0	0	0	3	1	5
Arizona	0	0	0	6	9	9	1	0	0	0	2	1
Utah [2]	2	6	0	24	15	15	0	0	0	2	1	0
Nevada	0	------	------	0	------	------	0	------	------	0	------	------
PACIFIC												
Washington	7	1	1	30	36	43	0	1	1	1	3	3
Oregon	3	1	1	11	16	37	10	0	0	3	6	3
California [3]	1	26	12	99	179	209	0	1	1	6	18	9
Total	205	163	122	2,568	3,571	3,673	44	61	124	176	196	275
46 weeks	9,200	6,793	6,793	138,396	140,137	195,700	2,176	9,062	9,062	8,911	11,922	13,408

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 16, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough, Week ended Nov. 16, 1940	Whooping cough, Week ended Nov. 18, 1939	Division and State	Whooping cough, Week ended Nov. 16, 1940	Whooping cough, Week ended Nov. 18, 1939
NEW ENG.			SO. ATL.—continued		
Maine	18	36	Georgia [3]	10	14
New Hampshire	0	4	Florida	7	11
Vermont	8	59	E. SO. CEN.		
Massachusetts	165	134	Kentucky	68	58
Rhode Island	2	25	Tennessee [3]	82	65
Connecticut	80	72	Alabama [3]	3	14
MID. ATL.			Mississippi [2 3]		
New York	465	352	W. SO. CEN.		
New Jersey	188	158	Arkansas	11	15
Pennsylvania	736	315	Louisiana [3]	4	5
E. NO. CEN.			Oklahoma	10	0
Ohio	420	245	Texas [3]	89	55
Indiana	20	43	MOUNTAIN		
Illinois	134	200	Montana	1	2
Michigan [2]	433	112	Idaho	6	0
Wisconsin	188	136	Wyoming	0	1
W. NO. CEN.			Colorado	38	23
Minnesota	52	42	New Mexico	9	32
Iowa	21	6	Arizona	10	5
Missouri	48	10	Utah [2]	25	62
North Dakota	19	13	Nevada	0	
South Dakota	2	0	PACIFIC		
Nebraska	21	5	Washington	57	27
Kansas	49	17	Oregon	24	22
SO. ATL.			California [3]	285	112
Delaware	46	18	Total	4,192	2,702
Maryland [2]	83	48	46 weeks	146,871	157,405
Dist. of Col.	3	11			
Virginia [3]	91	23			
West Virginia [2]	15	11			
North Carolina [3]	107	78			
South Carolina [3]	39	6			

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Nov. 16, 1940, 51 cases as follows: Virginia, 1; North Carolina, 1; South Carolina, 2; Georgia, 13; Tennessee, 4; Alabama, 10; Mississippi, 6, Louisiana, 2; Texas, 11; California, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended November 2, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	195	88	31	408	461	823	4	323	39	931	--------
Current week [1]	67	51	12	795	302	587	0	292	26	1,273	--------
Maine:											
Portland	0	------	0	0	1	0	0	0	1	5	17
New Hampshire:											
Concord	0	------	0	0	0	2	0	0	0	0	7
Manchester	0	------	0	0	5	3	0	0	0	0	14
Nashua	0	------	0	0	0	1	0	0	0	0	7
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	11
Rutland	0	------	0	0	0	0	0	0	0	0	6
Massachusetts:											
Boston	0	------	0	35	16	21	0	11	0	74	240
Fall River	1	------	1	2	2	0	0	5	0	5	45
Springfield	0	------	0	0	1	6	0	1	0	0	32
Worcester	0	------	0	81	7	0	0	2	2	2	76
Rhode Island:											
Pawtucket	0	------	0	0	1	0	0	0	0	0	18
Providence	0	------	0	2	1	2	0	0	0	16	59
Connecticut:											
Bridgeport	0	------	0	0	2	2	0	0	1	4	32
Hartford	0	------	0	0	0	0	0	0	0	3	32
New Haven	0	------	0	0	2	4	0	0	0	35	46
New York:											
Buffalo	0	------	0	2	11	8	0	8	0	17	167
New York	11	10	1	115	55	59	0	54	5	123	1,433
Rochester	0	------	0	0	1	4	0	1	1	21	55
Syracuse	0	------	0	0	0	0	0	3	0	9	50
New Jersey:											
Camden	1	------	0	41	1	3	0	1	0	2	21
Newark	0	------	0	3	3	1	0	7	0	21	82
Trenton	0	------	0	1	1	3	0	2	0	0	41
Pennsylvania:											
Philadelphia	1	1	1	151	14	34	0	18	2	127	413
Pittsburgh	2	1	0	0	13	13	0	4	0	43	149
Reading	0	------	0	5	1	6	0	3	0	0	21
Scranton	0	------	--------	0	-------	0	0	-------	0	0	--------
Ohio:											
Cincinnati	2	------	1	0	3	14	0	4	1	8	124
Cleveland	1	17	3	1	8	12	0	6	1	89	176
Columbus	1	------	0	0	3	5	0	1	0	14	80
Toledo	0	------	0	0	3	12	0	2	0	9	70
Indiana:											
Anderson	0	------	0	0	0	2	0	0	0	0	9
Fort Wayne	1	------	0	0	1	3	0	1	0	0	21
Indianapolis	1	------	0	1	8	14	0	2	1	2	95
Muncie	0	------	0	2	0	4	0	0	0	1	12
South Bend	0	------	0	0	0	0	0	0	0	0	14
Terre Haute	1	------	0	0	4	0	0	1	0	0	19
Illinois:											
Alton	0	------	0	0	0	2	0	0	0	0	9
Chicago	7	3	1	102	17	115	0	37	0	99	634
Elgin	0	------	0	0	0	0	0	0	0	6	7
Moline	0	------	0	0	0	0	0	0	0	0	7
Springfield	0	------	0	0	0	12	0	0	0	3	16
Michigan:											
Detroit	3	------	0	174	10	50	0	6	0	106	243
Flint	0	------	0	1	3	1	0	0	0	3	17
Grand Rapids	0	------	0	0	0	6	0	0	0	20	36
Wisconsin:											
Kenosha	0	------	0	1	0	0	0	0	0	0	11
Madison	0	------	0	2	0	0	0	0	0	3	28
Milwaukee	1	------	0	29	4	24	0	6	0	25	98
Racine	0	------	0	1	0	6	0	0	0	0	9
Superior	0	------	0	0	0	1	0	0	0	0	7

[1] Figures for Barre and Little Rock estimated; reports not received.

City reports for week ended November 2, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0		0	0	0	1	0	1	0	5	19
Minneapolis	0		0	3	1	25	0	0	0	22	85
St. Paul	0		0	2	5	11	0	1	0	14	50
Iowa:											
Cedar Rapids	0			0		7	0		0	0	
Davenport	0			0		5	1		0	0	
Des Moines	0		0	0	0	11	0	0	0	3	21
Sioux City	0			0		1	0	0		1	
Waterloo	0			0		2	0	0		0	
Missouri:											
Kansas City	1		0	0	3	10	0	2	0	21	82
St. Joseph	1		0	0	3	0	0	0	0	0	23
St. Louis	2		0	5	8	20	0	6	2	24	214
North Dakota:											
Fargo	0		0	0	0	1	0	0	0	4	5
Grand Forks	0			1		1	0		0	0	
Minot	0		0	0	0	1	0	0	0	2	12
South Dakota:											
Aberdeen	0			1		2	0		0	5	
Sioux Falls	0		0	0	0	6	0	0	0	0	9
Nebraska:											
Lincoln	0			1		5	0		0	0	
Omaha	0		0	0	4	2	0	0	0	6	43
Kansas:											
Lawrence	0		0	1	1	0	0	0	0	0	2
Topeka	0		0	0	0	1	0	0	1	2	
Wichita	0		0	0	0	1	0	1	0	14	23
Delaware:											
Wilmington	0		0	1	0	3	0	1	0	6	14
Maryland:											
Baltimore	1	1	1	6	7	9	0	8	0	68	218
Cumberland	0		0	0	0	0	0	0	1	1	10
Frederick	0		0	0	0	0	0	0	0	0	4
Dist. of Col.:											
Washington	2		0	3	10	8	0	9	1	11	152
Virginia:											
Lynchburg	0		0	0	0	1	0	1	0	0	8
Norfolk	0	9	0	0	2	3	0	0	0	0	38
Richmond	0		0	0	1	2	0	1	0	1	43
Roanoke	0		0	6	2	2	0	0	0	8	14
West Virginia:											
Charleston	1		0	0	2	0	0	0	0	0	12
Huntington	0			1		0	0		1	0	
Wheeling	0			1		2	0		0	3	
North Carolina:											
Gastonia	0			0		0	0		0	5	
Raleigh	0		0	0	1	1	0	0	0	2	13
Wilmington	0		0	0	2	0	0	1	0	0	12
Winston-Salem	0	2	0	1	0	3	0	1	0	24	19
South Carolina:											
Charleston	1	1	0	0	1	0	0	0	0	1	27
Florence	0		0	1	2	0	0	1	0	0	15
Greenville	1		0	0	1	1	0	1	0	1	6
Georgia:											
Atlanta	0	4	0	0	1	7	0	5	0	1	74
Brunswick	0		0	0	0	0	0	0	0	1	3
Savannah	2	2	0	0	0	0	0	3	0	0	32
Florida:											
Miami	0	1	0	0	1	0	0	1	1	0	34
Tampa	1		0	0	0	0	0	1	0	0	27
Kentucky:											
Ashland	0		0	0	0	2	0	0	0	0	4
Covington	0		0	1	2	0	0	3	0	0	19
Lexington	0		0	10	0	0	0	2	0	6	16
Tennessee:											
Knoxville	0		0	0	2	2	0	3	0	3	27
Memphis	2		0	4	2	11	0	4	1	1	69
Nashville	0		0	0	0	1	0	0	0	2	33
Alabama:											
Birmingham	0		0	3	6	3	0	3	0	4	69
Mobile	0	2	0	0	2	0	0	1	0	0	24
Montgomery	0			1		2	0		2	1	

City reports for week ended November 2, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	1	------	------	0	------	1	0	------	0	0	------
Little Rock	------	------	------	------	------	------	------	------	------	------	------
Louisiana:											
Lake Charles	1	------	0	0	0	2	0	0	0	0	5
New Orleans	3	------	1	1	5	1	0	12	0	11	123
Shreveport	0	------	0	0	1	0	0	1	1	0	41
Oklahoma:											
Oklahoma City	0	1	0	1	3	5	0	0	0	0	41
Tulsa	1	------	0	0	0	4	0	0	0	7	19
Texas:											
Dallas	3	------	0	0	1	1	0	2	0	6	56
Fort Worth	0	------	0	4	3	1	0	1	0	0	40
Galveston	0	------	0	0	2	0	0	1	0	0	15
Houston	3	------	0	0	5	3	0	4	1	1	89
San Antonio	0	2	1	0	2	0	0	5	0	1	53
Montana:											
Billings	0	------	0	0	1	0	0	0	1	0	9
Great Falls	0	------	0	0	1	1	0	0	0	0	8
Helena	0	------	0	0	0	0	0	0	0	0	1
Missoula	0	------	0	0	1	0	0	0	0	0	4
Idaho:											
Boise	0	------	0	0	1	3	0	0	0	0	10
Colorado:											
Colorado Springs	0	------	0	1	0	1	0	1	0	1	12
Denver	2	------	0	4	7	4	0	4	1	20	75
Pueblo	0	------	0	0	3	3	0	0	0	0	14
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	0	0	0	3
Utah:											
Salt Lake City	0	------	0	1	2	1	0	1	0	7	30
Washington:											
Seattle	3	------	0	2	4	3	0	1	0	19	112
Spokane	0	------	0	0	1	2	0	0	1	0	30
Tacoma	0	------	0	1	1	1	0	0	0	8	26
Oregon:											
Portland	2	3	0	2	1	1	0	2	0	14	83
Salem	0	------	------	0	------	0	0	------	0	2	------
California:											
Los Angeles	0	4	1	4	4	12	0	17	0	33	340
Sacramento	4	------	0	0	1	3	0	0	0	1	29
San Francisco	1	1	0	0	4	5	0	9	0	46	195

City reports for week ended November 2, 1940—Continued

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases	State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
New Hampshire:				South Dakota:			
Nashua	0	0	1	Aberdeen	0	0	1
Massachusetts:				Nebraska:			
Springfield	1	1	0	Omaha	0	0	2
Worcester	1	1	0	Kansas:			
Rhode Island:				Wichita	0	0	1
Providence	1	0	0	Virginia:			
New York:				Norfolk	0	0	1
New York	2	1	3	Richmond	0	0	2
Pennsylvania:				Roanoke	0	0	2
Philadelphia	0	0	3	Florida:			
Reading	0	0	1	Miami	0	0	1
Ohio:				Alabama:			
Cincinnati	0	0	1	Mobile	2	0	0
Cleveland	0	0	2	Louisiana:			
Columbus	0	0	2	Shreveport	0	0	2
Toledo	0	0	4	Texas:			
Illinois:				Fort Worth	0	0	1
Chicago	0	0	6	Houston	0	0	1
Michigan:				San Antonio	1	1	0
Detroit	0	0	2	Montana:			
Flint	1	0	0	Missoula	0	0	1
Grand Rapids	0	0	1	Colorado:			
Wisconsin:				Denver	0	0	1
Milwaukee	0	0	2	Utah:			
Minnesota:				Salt Lake City	0	0	1
Duluth	1	0	1	Washington:			
Minneapolis	0	0	6	Seattle	0	0	3
Iowa:				Spokane	0	1	3
Des Moines	0	0	1	Tacoma	0	0	1
Missouri:				California:			
Kansas City	0	0	4	Los Angeles	0	1	2

Encephalitis, epidemic or lethargic.—Cases: Tampa, 1.
Pellagra.—Cases: Savannah, 8; Montgomery, 1; San Antonio, 1; Los Angeles, 1.
Typhus fever.—Cases: New York, 1; Newark, 1; Atlanta, 1; Savannah, 5; Mobile, 1; Montgomery, 1; Lake Charles, 1; Houston, 1. Deaths: Mobile, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 19, 1940.—During the week ended October 19, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1		3	2		1			7
Chickenpox		3		110	163	42	23	53	62	456
Diphtheria		14	1	51	2	3	1	1		73
Dysentery				3	4				1	8
Influenza		5			9				26	40
Measles	12	26	1	114	89	29	32	62	25	390
Mumps				6	72	16		0	3	106
Pneumonia		4			12	1	3		13	33
Poliomyelitis			1	3	5					9
Scarlet fever		5	5	70	101	7	12	8	7	215
Trachoma									36	36
Tuberculosis		12	2	61	54	5		5		139
Typhoid and paratyphoid fever		1		42	13	4		3	5	68
Whooping cough				232	150	44	8	27	9	470

EGYPT

Infectious diseases—First quarter 1940.—During the first quarter of 1940, certain infectious diseases were reported in Egypt as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	1		Plague	246	119
Cerebrospinal meningitis	67	27	Poliomyelitis		3
Chickenpox	584	6	Puerperal septicemia	112	79
Dengue	1		Rabies	5	5
Diphtheria	349	117	Scarlet fever	45	
Dysentery	310	58	Smallpox	1	
Erysipelas	1,075	99	Tetanus	118	65
Influenza	1,877	38	Tuberculosis (all forms)	1,504	808
Leprosy	165	17	Typhoid fever	786	164
Lethargic encephalitis		2	Typhus fever	1,329	309
Malaria	664	8	Undulant fever	4	
Measles	4,181	511	Whooping cough	915	27
Mumps	863	7			

Vital statistics—First quarter 1940.—Following are vital statistics for the first quarter of 1940 for all places in Egypt having a health bureau:

Number of births	65,161	Deaths per 1,000 population	24.1
Live births per 1,000 population	51.2	Deaths under 2 years of age	7,483
Number of stillbirths	1,193	Deaths under 2 years of age per 1,000 live births	115
Total deaths	30,724		

FINLAND

Communicable diseases—4 weeks ended September 7, 1940.—During the 4 weeks ended September 7, 1940, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	206	Poliomyelitis	141
Dysentery	7	Scarlet fever	313
Influenza	755	Typhoid fever	29
Lethargic encephalitis	1	Undulant fever	4
Paratyphoid fever	285		

HAWAII

Influenza.—During the week ended November 8, 1,746 cases of influenza were reported in Hawaii, of which 485 cases, with 1 death, occurred on the island of Oahu.[1] During the week ended November 15, 1,115 cases, with no deaths, were reported. Of these, 186 cases were reported from the island of Oahu.

JAMAICA

Communicable diseases—4 weeks ended October 26, 1940.—During the 4 weeks ended October 26, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	1	9	Leprosy	1	3
Diphtheria	1	4	Puerperal sepsis		3
Dysentery	17	9	Tuberculosis	22	84
Erysipelas	1	2	Typhoid fever	4	43

SWEDEN

Notifiable diseases—August 1940.—During the month of August 1940, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	3	Scarlet fever	1,101
Diphtheria	20	Syphilis	20
Dysentery	53	Typhoid fever	4
Gonorrhea	1,032	Undulant fever	7
Paratyphoid fever	116	Weil's disease	1
Poliomyelitis	73		

[1] For reports from September 28 to October 4, see Public Health Reports for November 8, 1940, p. 2097.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of October 25, 1940, pages 1973-1976. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Area.—A rat found on October 17, 1940, about 2 miles from Paauhau Landing in the Paauhau Area, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

Peru.—During the month of September 1940, plague was reported in Peru, by Departments, as follows: Lima, 3 cases, 3 deaths; Tumbes, 1 case, 1 death. Plague-infected rats were also reported in the city of Trujillo, Libertad Department.

Yellow Fever

Sudan (Anglo-Egyptian).—On November 7, 1940, the Nubia Mountain area of Anglo-Egyptian Sudan was declared by the Government to be infected with yellow fever. For the week ended November 9, 733 cases of yellow fever, with 75 deaths, were reported in Kordofan Province, Anglo-Egyptian Sudan.

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Public Health Reports

VOLUME 55 NOVEMBER 29, 1940 NUMBER 48

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE

1798

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

PREVALENCE OF DISEASE

Public Health Reports

Vol. 55 • NOVEMBER 29, 1940 • *No. 48*

THE TUMOR CLINIC OF THE BALTIMORE MARINE HOSPITAL[1]

By ERNEST R. BRYAN, *Associate Health Education Specialist, United States Public Health Service*

A total of 226 patients have been treated for cancer by surgery, X-ray, radium, or by combinations of these three methods during the first 8 months of the operation of the new tumor clinic at the Marine Hospital maintained by the United States Public Health Service at Baltimore, Md.

In addition to these patients who have received treatment at the clinic, 146 other persons have been examined for cancer symptoms by the clinic staff and the practicing physicians in Baltimore who act as consultants for certain types of cancer cases. One hundred and thirteen of the 146 consultations were in-patients while 33 were out-patients.

Of the 226 patients treated by the clinic, 183 have been hospitalized during the 8-month period from November 1, 1939, to June 30, 1940, and the remaining 43 have been treated as out-patients. The seriousness of the illness of these 226 patients is shown by the record of 27 deaths. Nineteen post-mortem examinations have been obtained, an autopsy record of 70 percent.

The clinic is maintained for beneficiaries of the Public Health Service who are located east of the Mississippi River. The number of these beneficiaries is 170,000, of whom 40,000 are now in the age group in which cancer most frequently occurs. Sixty-three of the first 226 patients, or 28 percent, were veterans, while 51, mostly merchant seamen, were transferred to the clinic from other marine hospitals.

Two hundred and twenty-nine specimens of tissue believed to be cancerous were examined histologically and 152 photographs were taken of 97 different tissue specimens or of patients with certain types of external cancer during this period.

In addition to care and dressings on the wards, the 226 patients were treated, dressed, or had some form of special care requiring the

[1] Grateful acknowledgment is made to Dr. John E. Wirth, director of the tumor clinic, for his assistance during the preparation of this article.

clinic examining room and its facilities on 3,219 occasions. This means approximately 14 visits per patient.

The Baltimore Marine Hospital was selected as the location for this new clinic because it is closest to the National Cancer Institute in Bethesda, Md., and because necessary alterations in the building there could be made at a minimum of expense.

Erection of an additional floor for the tumor clinic on one of the hospital wings was made possible by funds allocated by the Public Works Administration. It was built at a cost of $93,770.16. This added section, which is 100 by 45 feet, contains offices, X-ray treatment rooms, examining rooms for hospitalized patients, doctors' offices, secretary's office, photographic and dark rooms. One hundred beds are available for clinic patients in the adjoining wings of the same floor. The basement of the south wing of the Marine Hospital, an open space of some 84 by 25 feet, was renovated and in it were installed a $15,000 radium laboratory with an emanation plant, out-patient clinic for X-ray treatment, examining and dressing rooms, physicist's office, and laboratory. The out-patient demands, however, have not been sufficiently heavy as yet to occasion use of the out-patient facilities.

The clinic contains adequate examining rooms, a minor surgery section, and instruments necessary for complete diagnosis and treatment of practically all types of cancers. Great emphasis is placed on early diagnosis. It is believed that no patient can be properly treated for a cancer unless the exact type of the cancer is established.

Complete case histories are kept on all clinic patients in order that the progress of the cases may be noted and future treatments outlined. Statistical studies of these records should shed much light on the scope of the cancer problem. They should also serve as a yardstick to measure progress or improvement in the results obtained following treatment.

The library is supplied with current medical journals to keep the personnel, as well as any visiting physician, informed as to the latest developments in cancer work. A photographic department is maintained to record graphically visible tumors before and after treatment.

The tumor clinic has two 250 K. V. P. (kilovolt-peak) X-ray machines and one 140,000 volt X-ray machine. These X-ray machines are in specially constructed rooms on the fourth floor. The front walls are lined with 6 millimeters of lead up to a height of 7 feet. The floor and inner walls are lined with 3 millimeters of lead. The purpose of the lead is to protect the personnel from overexposure to radiation. There are other rooms for two 250,000-volt X-ray machines.

Each X-ray machine has a lead housing designed to allow a limited beam of X-rays to be projected into the area to be treated and to prevent stray radiation from reaching persons other than the patient.

The housing is designed to allow as little exposure as possible of the operator to the rays.

The 140,000-volt X-ray is used for superficial therapy in cases of skin cancer, infections, or in cases where great penetration is not required. For deep therapy the 250,000-volt X-ray machine is used. It permits greater dosage in the tumor with less damage to the skin and overlying structures and is particularly valuable in tumors of the bladder, cervix, and uterus.

The two 250,000-volt X-ray machines are the latest type obtainable. This type resulted from a recent development by the General Electric Co. utilizing the resonant transformer principle. They have the advantages of a high output of very heavily filtered radiation, flexibility, ease of manipulation, and economy of operation. They are capable of delivering 75 r. (measured in air) per minute at 50 cm. target skin distance through an inherent filter of 1.5 mm. of copper by virtue of a grounded anode tube. A Leeds & Northrup self-recording and integrating X-ray intensity measuring device also has been obtained and is proving to be very valuable in experimental work.

In order that the clinic might function as a separate department in the hospital the necessary surgical equipment for minor or special operations was obtained. This included many diagnostic instruments such as laryngoscopes, esophagoscopes, bronchoscopes, and sigmoidoscopes. New chart carriages, forms, wheel chairs, tables, endotherm and actual cauteries, suction and spray machines, microscopes, and projectors also have been purchased.

There are certain cancers which may be more advantageously treated by radium, and this substance forms a very important part of the armamentarium of this modern cancer clinic.

The radium emanation plant of the clinic at Baltimore is a cell surrounded by a wall of concrete 2 feet thick. The storage room has concrete walls 1 foot thick. The control room, which is 9 feet from the radium, is a concrete cell with walls 2 feet thick. Direct vision is allowed through a window made of 50 percent lead content. One inch of lead glass is equivalent to one-half inch of lead as far as gamma rays are concerned. A safe lined with 3 inches of lead is used for storing radon and radium. The emanation plant is designed for 5 grams of radium.

Three hundred and thirty-four milligrams of radium element in needles and capsules have been obtained on loan from the National Cancer Institute, in addition to 1 gram of radium element in soluble salts for the emanation plant. The clinic has installed the first remote-controlled Failla type emanation plant in existence. With the aid of this and an automatic gold radon tube measuring device designed and constructed at the clinic, the exposure to the operator is cut to less than 1 percent of its former figure, thus enabling the same

operator to handle this plant for years without fear of harmful exposure.

It is in the Failla semiautomatic emanation plant that the radium is stored and radon, the first product of disintegration of radium, is obtained. With this gaseous substance any type of applicator that may be desired can be made. The greatest advantage of this is the production of gold radon seeds which may be buried in a tumor and left indefinitely, as the radon loses its energy at the rate of one-sixth of its value per day. A large dose of radiation may be given to a tumor by this means without greatly affecting the surrounding tissues, and without the necessity of removing the needles or applicators at a later time, as would be necessitated by the use of radium. The measuring equipment was built in a machine shop maintained by the tumor clinic.

The hazard of leakage of gas is largely prevented by the design of the ventilation system, which is so constructed that no gas can escape into the hospital.

The physics laboratory has under construction an integrating and recording type Geiger counter for protective measurements, searching for lost radium, and for experiments on artificially radioactive materials. A scale of eight counter, an FP–54 vacuum tube electrometer, an oscillograph, a linear amplifier, and other small apparatus also are being assembled by the clinic's physicist.

A photographic department consisting of a photographic and dark room has been equipped with an 8- by 10-inch studio camera, a 3¼- by 4¼-inch portable Recomar 33 camera and attendant devices to take and develop all clinical and pathological photographs as well as produce positive paper prints, enlargements, transparencies, and lantern slides.

In order to service and make much of the precise measuring apparatus, treatment devices, tools, etc., necessary for the tumor clinic, the machine shop has been equipped with a new small high precision monarch lathe, a milling machine, drill presses, saws, punches, grinders, buffers, and attendant micrometers and measuring instruments at a cost of $10,000.

As the need has arisen the original personnel of director, physicist, and secretary has been supplemented in succession by a pathologist, a junior medical officer, a machinist, an X-ray and radium technician, and an associate to the director. The salaries of most of this personnel are financed from the budget of the National Cancer Institute. Nursing personnel, orderlies, porters, and maids have been supplied by the Hospital Division of the Public Health Service.

It is hoped that the tumor clinic will add to the fund of scientific knowledge concerning the nature and cause of the disease as it seeks

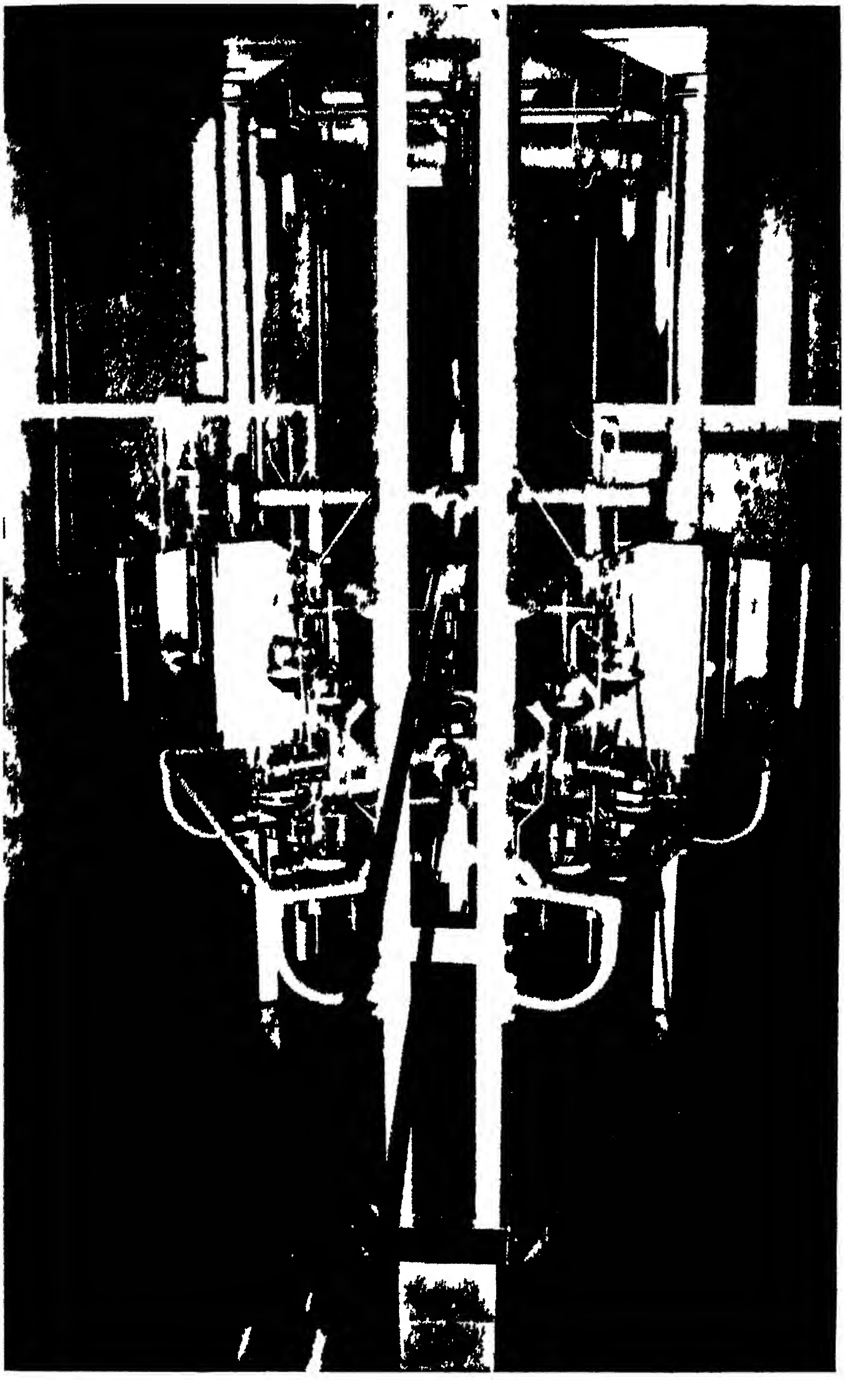

FIGURE 1.—View of Failla radon emanation plant at the Tumor Clinic U S Marine Hospital, Baltimore, Md This plant is the only one of its kind in the world which is operated by remote control

FIGURE 2.—Physicist measures and clips off radon needles from radon emanation plant by remote control. He views the plant through a window which is 50 percent lead and 50 percent glass.

PLATE III

FIGURE 3 Doctor and nurse prepare patient for X ray therapy Radiation will be applied to malignant growth on the ear A protective lead shield is placed around the cancerous area

to give the best possible treatment and care to an increasing number of cancer patients.

In 1939 there were recorded in the United States approximately 151,000 deaths from cancer. It is estimated that the prompt application of existing knowledge of cancer control would have saved about a quarter of these, or 35,000 lives. The clinic aims to do its full part in cutting down cancer death tolls through its own activities and by serving as a demonstration unit.

THE NATIONAL HEALTH SURVEY*

RECEIPT OF MEDICAL SERVICES IN DIFFERENT URBAN POPULATION GROUPS

By Rollo H. Britten, *Senior Statistician, United States Public Health Service*

CONTENTS

INTRODUCTION

General findings of the National Health Survey with respect to the occurrence of disease, accidents, and impairments have been recorded in a previous report.[1] At this time it is desired to present data on the receipt of medical care for such cases.

The scope, method, and general definitions of the National Health Survey have been described elsewhere.[2] It was a house-to-house canvass of 703,092 urban families in 18 States and 36,801 families in certain rural areas to determine the frequency of serious disabling illnesses, the medical services received in connection with such illnesses, and the relation of these items to certain social and economic conditions. The survey was patterned on previous ones conducted

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*From the Division of Public Health Methods, National Institute of Health. The survey, a house-to-house canvass, was executed with the aid of grants from the Works Progress Administration. Acknowledgment is made to various members of the National Health Survey staff for assistance in the preparation of this article.

[1] The National Health Survey: Some general findings as to disease, accidents, and impairments in urban areas. By Rollo H. Britten, Selwyn D. Collins, and James S. Fitzgerald. Pub. Health Rep., 55: 444–470 (March 15, 1940). (Reprint 2143.)

[2] The National Health Survey: Scope and method of a nation-wide canvass of sickness in relation to its social and economic setting. By George St. J. Perrott, Clark Tibbitts, and Rollo H. Britten. Pub. Health Rep., 54: 1663–1687 (September 15, 1939). (Reprint 2098.)

Reference may be made also to The National Health Survey, 1935–1936: Illness and Medical Care in Relation to Economic Status, Preliminary Reports, Sickness and Medical Care Series, Bulletin No. 2, Division of Public Health Methods, National Institute of Health, U. S. Public Health Service; and to Health as an Element in Social Security, by George St. J. Perrott and Dorothy F. Holland, Ann. Am. Acad. Polit. and Soc. Sc., 202: 116–136 (March 1939).

by the Public Health Service and in general followed the established techniques developed in such surveys, information being obtained by trained enumerators from the housewife or other responsible member of the household. In this survey, periodic visits were impracticable. Because it was recognized that at a single visit no complete record of all illnesses occurring over a 12-month period could be obtained, the queries centered around illnesses disabling for 7 consecutive days or longer during the 12 months immediately preceding the visit. The canvassing was carried on from November 1935 to March 1936.

The annual frequency of illnesses disabling for a week or longer was 171 per 1,000 persons observed.[3] The medical care data presented in this report relate solely to this group of cases. Disability was defined as inability to work, attend school, care for home, or carry on other usual pursuits by reason of disease, accident, or physical or mental impairment. For the purpose of this summary report, all persons in hospitals or other institutions for the care of disease for the entire 12 months immediately preceding the visit have been excluded.[4]

The data in this article have been confined to the urban survey and, except for a special section comparing the medical services received by the white and by the colored populations, have been based on white persons (the total for the urban area being 2,249,995,[5] or 3.6 percent of the urban white population of the United States in 1930).[6]

The following points of information on medical services (for illness disabling for a week or more) were obtained:

(*a*) Whether the case was attended by a doctor.[7]

(*b*) Whether the doctor's service was rendered in a hospital, at the patient's home, or in a public clinic or outpatient department of a hospital.

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[3] Certain points require emphasis. (*a*) One person may have had more than one recorded illness during the year. (*b*) An illness due to more than one diagnosis was counted only once in the computation of this rate. (*c*) Cases with onset of disability prior to the 12-month period were included, the frequency of such cases being 18 per 1,000 persons. (*d*) Records of all confinements, hospital cases, and deaths were included without limitation as to the duration of disability, the rate for cases in these categories which had disabled for less than 7 days being 4 per 1,000 persons.

[4] Persons in institutions for the care of physical or mental diseases were not directly enumerated in the survey, but the family was asked to report any such persons who had formerly lived in the household. The record obtained was incomplete. For instance, the frequency of cases in institutions for the care of disease for the whole 12 months immediately preceding the visit was 0.8 per 1,000 persons in the entire population, giving 0.29 days per person. On the basis of data in the Census of Hospitals of the American Medical Association relating to the year 1935, hospital days for patients in tuberculosis and mental hospitals in the country as a whole amounted to 1.63 per person in the entire population (Am. Med. Assoc., Hospital Services in the United States. J. Am. Med. Assoc., 106: 790 (Mar. 7, 1936)).

[5] The enumerated white urban population with known family income and known age was 2,152,740, which is the general population base used in this report.

[6] The sample was chosen to be representative in general of cities in the United States according to region and size. In large cities (100,000 and over) the population to be canvassed was determined by a random selection of many small districts based on those used in the U. S Census of 1930. In the smaller cities selected for study the population was enumerated completely. See Perrott, Tibbitts, and Britten, op. cit., for a more detailed account of the sampling procedure and a comparison of certain characteristics of the population enumerated with those of the urban population as a whole (Census, 1930).

(Continued on next page)

(*c*) The number of calls (visits) by or on a doctor, exclusive of any made to inpatients in a hospital.

(*d*) Whether the case was hospitalized (i. e., in hospital for 24 hours). "Hospital" meant any institution for the care of physical or mental disease.[8]

(*e*) The number of days the person was hospitalized for the particular illness.

(*f*) Whether the case was attended by a private duty nurse, i. e., bedside care by a full-time nurse, including care by special nurses in hospital but not nursing service rendered by the hospital without special charge.[9] No attempt was made to distinguish between registered and nonregistered nurses.

(*g*) The number of days of nursing service rendered by the private duty nurse. Where the patient was attended by both day and night nurses, 2 days of care were recorded for each attended day.

Footnote 6—Continued.

The number of cities of different sizes which were included in the Health Survey sample is shown in the following table

	Size of city (Census, 1930)					
	500,000 and more	100,000 to 500,000	25,000 to 100,000	10,000 to 25,000	5,000 to 10,000	Under 5,000
Total	10	21	10	8	20	14
Northeast	5	4	2	3	6	1
North Central	4	6	3	1	7	2
West	1	5	1	2	4	6
South	----------	6	4	2	3	5

In connection with the data furnished on hospital care in this report, attention is called to the fact that some of the smaller cities and towns did not contain hospitals. The number of such cities (1930) is shown in the following table.

	Size of city (Census, 1930)		
	10,000 to 25,000	5,000 to 10,000	Under 5,000
Total	1	6	7
Northeast	----------	2	1
North Central	----------	2	*2
West	1	2	2
South	----------	----------	2

*One city contained tuberculosis hospital only.

[7] The term "doctor" refers to physicians and a relatively small number of other practitioners (95 percent of attended cases were attended by physicians). The family reported the name of the doctor, and the type of attendant was coded by reference to telephone directories and to the American Medical Directory.

[8] As stated above, cases in an institution for the full 12 months immediately preceding the visit have been excluded from the present report.

[9] Of 13,927 cases attended by a private duty nurse, 6,671 (white, urban, known income, known age) were not hospitalized. The others were hospitalized, but the nursing care may have been given before or after the period of hospitalization.

(*h*) Whether nurses from any agency made visits in connection with the disabling illness, including service from private duty nurses secured on an hourly basis.[10]

For the various types of services discussed, numerous relations may be set up with respect to the population surveyed or to the illnesses themselves. Among such relations are:

Number of disabling illnesses receiving care:
- Per 1,000 persons observed.
- Per 100 illnesses.

Volume of services rendered (number of calls, visits, etc.):
- Per person observed.
- Per illness.
- Per illness receiving the specified care.

In table 1 are shown these five types of rates (total urban area, white) for the various kinds of care. The table carries detailed explanatory notations and later tables should be considered in the light of such comments. Owing to wide differences in medical services in communities of different sizes, the rates for the total urban area are of limited use, and are given largely to indicate the inherent relations and qualifications.

TABLE 1.—*Summary of information on medical care received for disabling illness.*[a] *Urban, white*

Type of rate	Doctor[b]				Hospital[d]	Nursing	
	Total[c]	Exclusive of hospital care[d]				Private duty[h]	Visiting
		Total[e]	Home[f]	Public clinic[g]			
ANNUAL NUMBER OF DISABLING ILLNESSES[a] RECEIVING SPECIFIED CARE							
Per 1,000 persons observed	138	127	91	8.8	47	6.5	11.9
Per 100 illnesses[a]	81	75	53	5.2	27	3.8	7.0
ANNUAL VOLUME OF SERVICES RENDERED							
		Calls	*Calls*		*Days*	*Days*	*Visits*
Per person observed	--------	0.90	0.53	--------	0.89	0.17	0.06
Per illness[a]	--------	5.3	3.1	--------	5.2	1.0	.37
Per illness receiving specified service	--------	7.4	5.9	--------	19.	26.	5.3

[a] Disabling for 7 consecutive days or longer during the 12 months immediately preceding the visit, exclusive of cases in hospital for the entire period. Hospital cases, confinements, and fatal cases which disabled for less than 7 days are included.
[b] The term "doctor" refers to physicians and a relatively small group of other practitioners.
[c] Comprises cases in which the only care by a doctor was given in a hospital and those listed in footnote *e*.
[d] Hospital care refers solely to inpatient care. Cases in hospital for the entire 12 months preceding the visit are excluded. Hospital cases which disabled for less than 7 days are included.
[e] Comprises cases treated by a doctor at home, in the doctor's office, or in a clinic or outpatient department of a hospital.
[f] Refers to cases treated at home whether or not other types of medical service were also given.
[g] Includes cases treated in outpatient departments of hospitals.
[h] Exclusive of floor duty nursing service in hospital.

[10] Two items not used in this report should be mentioned: Whether an operation was performed, and whether the person had a doctor for a previous attack of the same disease during the 12 months preceding the visit.

The rate of medically attended cases (including hospital medical care) was 138 per 1,000 persons per year; but it must be constantly kept in mind that this rate covers only cases disabling for a week or longer during the 12-month period. Since medical service must be related to the need for it, the second line of the table gives the percentage of illnesses disabling for a week or longer which were medically attended. With an illness rate of 171 per 1,000 persons (see p. 2200), the percentage of illnesses which were medically attended becomes 81.

The rate for cases attended by a doctor outside of the hospital was 127 per 1,000 persons and for cases attended by a doctor in the home was 91. The percentages of disabling illnesses receiving these types of care were 75 and 53, respectively.

Volume of services (number of calls) is also an important measure of care; hence, the lower part of the table is concerned with this aspect. Calls (outside of hospital) were 0.9 per person observed. The next line of the table relates the calls to the disabling illnesses (whether or not attended), and the last line relates them to the illnesses which received the specified service. For the purpose of the present report this final conception (volume of service per case receiving the specified service), together with the proportion of all disabling illnesses which received the services, form the fundamental measures of medical care.

It will be observed that the annual frequency of hospital cases per 1,000 persons was 47. As pointed out, an attempt was made to obtain a record of hospital cases whether or not the illness was disabling for a week or more. Comparisons with other data suggest that a portion of short hospital cases were unreported, perhaps owing to failure of the family informants to remember all such cases. As a result the average duration of time in the hospital is relatively high in comparison with previous studies.[11] While tuberculosis sanatoria and mental hospitals are included under "hospital," in evaluating the data it is to be recalled that persons in institutions for the care of disease for the full 12 months immediately preceding the visit have been excluded. This exclusion has little effect on the frequency of hospitalized cases or the percentage of disabling illnesses hospitalized, but a major effect on the days in hospital.[12]

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[11] In the survey of the Committee on the Costs of Medical Care, the rate of hospital cases per 1,000 persons was 58.6 (general hospitals) and the days hospitalized 0.75 per person. The corresponding figures in the Health Survey were 47 and 0.89. See The Incidence of Illness and the Receipt and Costs of Medical Care Among Representative Families. Experiences in Twelve Consecutive Months During 1928-31. By I. S. Falk, Margaret C. Klem, and Nathan Sinai. Publications of the Committee on the Costs of Medical Care, No. 26. The University of Chicago Press, Chicago, Ill. (Appendix table B-27, p 283.)

[12] The percentage of illnesses disabling for a week or more which received hospital care is slightly in excess of the correct value for cases of this minimum duration of disability, since, as indicated, hospitalized cases have been included whatever the duration of disability. However, the rate of hospitalized cases disabling for less than a week was only 1.9 per 1,000 persons.

Since interpretation of the percentage of cases receiving medical care rests on the composition of the total group of cases, some further description from this point of view seems desirable:

(*a*) As stated, the cases were illnesses disabling for a week or longer; hence, they were of a relatively severe nature.

(*b*) There was considerable variation with age in the frequency and disability rates (see table 2).

TABLE 2.—*Annual frequency and disability rates of illnesses disabling for a week or longer. Urban, white* *

Age (years)	Frequency per 1,000 persons	Days of disability [1]		Number of illnesses
		Per person	Per case	
All ages	171	9.5	56	367,257
Under 15	224	5.8	26	116,347
15–24	128	5.1	40	48,930
25–64	149	9.9	67	167,129
65 and over	275	35.1	129	34,851

* See footnote *a*, table 1.
[1] Excludes cases with unknown duration of disability.

(*c*) The rates were sharply differentiated by income (see table 3), being especially high in the relief group. (Further discussion of illness by economic status will be found on p. 2207.)

TABLE 3.—*Annual frequency of illnesses disabling for a week or longer as related to economic status. Urban, white* *

Annual family income and relief status	Frequency per 1,000 cases	Ratio to rate in highest income group ($5,000 and over=100)	Number of illnesses
All incomes	171	116	367,257
Relief	237	161	85,029
Nonrelief:			
Under $1,000	179	122	82,986
$1,000 to $2,000	152	103	136,114
$2,000 to $3,000	146	99	40,057
$3,000 to $5,000	145	99	15,838
$5,000 and over	147	100	7,233

* See footnote *a*, table 1.

(*d*) The distribution of cases by the sole or primary diagnosis [13] is indicated in table 4.

[13] The primary diagnosis is that which had been associated with the disability for the longest period; or, if a separate period of disability was not specified for any diagnosis, the primary diagnosis is the one which was regarded by the family as the most important cause of the disability.

Cases are classified by diagnosis in this report in accordance with the statements given by the family. (See Perrott, Tibbitts, and Britten, op. cit., for discussion of use made of confirmations of diagnoses received from physicians.)

Syphilis and gonorrhea, although of recognized importance as causes of disability, are not given separately in the table because of the incompleteness of reports of such diseases in a house-to-house canvass.

TABLE 4.—*Percentage of illnesses disabling for a week or longer which were due to various diagnoses (sole or primary). Urban, white* *

Item number	Diagnosis	Percentage
	All diagnoses [f]	100.0
	Communicable diseases:	
1	Common communicable diseases of childhood	16.3
2	Other	1.5
3	Cancer and other tumors	1.7
4	Diabetes mellitus	.5
5	Rheumatism and allied diseases	3.3
6	Cardiovascular-renal diseases	6.2
7	Nervous and mental diseases	2.9
8	Diseases of ear and mastoid process	1.2
	Diseases of respiratory system:	
9	Tuberculosis (including nonrespiratory)	.7
10	Pneumonia (all forms)	2.7
11	Tonsillitis (including tonsillectomies)	6.0
12	Other diseases of respiratory system (colds, influenza, etc.)	20.6
	Diseases of digestive system:	
13	Appendicitis (including appendectomies)	3.0
14	Hernia	.6
15	Diseases of teeth, mouth, and gums	.3
16	Other diseases of the digestive system	4.4
17	Diseases of the thyroid gland	.4
18	Anemia	.3
19	Hemorrhoids	.4
20	Varicose veins	.2
21	Diseases of bladder, urethra, urinary passages, and male genital organs	.7
22	Diseases of female genital organs and complications of pregnancy	1.7
	Confinements:	
23	Live births	8.1
24	Other	.6
25	Diseases of skin and cellular tissue	1.2
26	Accidents	9.1
27	Orthopedic impairments	1.4
28	Blindness and deafness	.2
29	Other and ill-defined diagnoses	3.7

* See footnote *a*, table 1.

[f] For specific classification of diagnoses into these categories, see reference *f* in "References to Tables and Charts," Perrott, Tibbitts, and Britten, op. cit.

(*e*) As has been noted in all previous surveys, the amount of disability is not distributed evenly over the population, but is concentrated among certain persons and in certain households. The percentage distribution of persons and of households [14] by the number of days disabled is shown in table 5. The inequality in the illness load is evident and suggests the widely different economic problem for particular persons or particular households, both in terms of loss of wages (or other effects of disability) and in terms of the cost of medical care.

TABLE 5.—*Percentage distribution of persons and of households according to amount of disability from illnesses disabling for a week or longer in a 12-month period. Urban, white* *

Days of disability	Percentage [b]	
	Persons	Households
Total	100.0	100.0
None	85.0	60.7
1–11	3.7	6.3
12–17	2.5	5.1
18–29	3.1	6.5
30–179	4.2	15.1
180–359	.5	2.3
360 and more	1.0	4.0

* See footnote *a*, table 1. [b] Based on a 0.5 percent random sample of punched cards.

[14] The term "household" is used instead of "family" since persons unrelated to the head are included. The household was a group of persons (or a single person) living in one abode or dwelling unit.

SIZE OF CITY

The relative availability of medical facilities in communities of different sizes is one of the factors determining the extent of medical care received. In large cities any type of service is available and its receipt depends on numerous factors, including economic status. In smaller cities there is some limitation in the types of medical services available. In small towns (and rural areas) there is much greater restriction. These factors are fundamental in producing the variations shown in tables 6 and 7, giving the percentage of illnesses (of the type stated) receiving various kinds of medical care, and the services per case, by size of city.

TABLE 6.—*Percentage of disabling illnesses receiving various types of medical care, by size of city. Urban, white* *

Size of city	Doctor				Hospital	Nursing		Total number of illnesses
	Total	Exclusive of hospital care				Private duty	Visiting	
		Total	Home	Public clinic				
All sizes	81	75	53	5.2	27	3.8	7.0	367,257
100,000 and over	83	75	52	6.4	30	3.4	7.7	252,205
25,000 to 100,000	79	75	57	3.4	23	4.8	4.7	55,810
Under 25,000	75	72	54	1.3	19	4.4	6.0	59,242

* See footnotes, table 1.

TABLE 7.—*Services per case receiving specified types of medical care, by size of city. Urban, white* *

Size of city	Doctor, exclusive of hospital care		Hospital (days)	Nursing	
	Total (calls)	Home (calls)		Private duty (days)	Visiting (visits)
All sizes	7.4	5.9	19	26	5.3
100,000 and over	7.5	5.9	20	29	5.2
25,000 to 100,000	7.4	5.7	17	21	6.5
Under 25,000	7.1	5.9	18	23	5.2

* See footnotes *a*, *b*, *d*, *e*, *f*, and *h*, table 1.

The percentage of illnesses disabling for a week or longer which did *not* receive medical attention varied as follows by size of city (first column of table 6, figures subtracted from 100):

	Percentage
100,000 and over	17
25,000 to 100,000	21
Under 25,000	25

The most notable change with size of community was in the percentage receiving hospital care, the figures being, respectively, 30, 23, and 19.[15]

The services per case receiving the specified service (see table 7) are not determined to any great extent by availability of medical facilities and hence do not show consistent relations. There was, however, a tendency for the large cities to have a greater number of hospital days per hospital case and a greater number of nursing days per private duty nurse case.

ECONOMIC STATUS

No one facet of the problem of distribution of medical services is so important as economic status. The National Health Survey shows: (1) That a large proportion of the population had incomes that left no margin or only a small margin for meeting the costs of medical care; (2) that the illness rates were highest in the groups least able to meet such costs; and (3) that, in general, persons at the lowest economic levels received the least medical care.

In the Health Survey, families were classified by income received during the 12 months preceding the interview and also by whether

[15] As stated in the introduction, the National Health Survey was carried out also in certain rural areas. In Georgia 16 counties were sampled (the population covered being 31,679 white persons and 21,607 Negroes); in Michigan the counties of Hillsdale, Crawford, Otsego, and Roscommon were completely enumerated (the white population covered in places under 2,500 and in purely rural areas being 31,878); in Missouri the counties of Livingston, Linn, and Howell were completely enumerated (the white population covered in places under 2,500 and in purely rural areas being 38,035). In view of the fact that these areas cannot be taken to be representative of rural United States generally, direct comparison with the data for the 83 cities is justified only in a broad way. On the other hand, the sharp contrast offered, especially with respect to hospitalization, is of interest. No averages for the entire rural sample seem legitimate, but Georgia has been presented in one group and certain other combinations of counties made where they seemed similar enough to justify this.

It is evident from the following table that the percentage of disabling illnesses which were hospitalized was very much less in the rural areas surveyed than in the urban areas. Very much lower percentages were also noted for visiting nurse services. Other differences may be observed from the table.

*Percentage of disabling illnesses receiving various types of medical care (rural, white)**

Community	Doctor		Hospital	Nursing		Total number of illnesses
	Total	Exclusive of hospital care		Private duty	Visiting	
Towns and villages under 2,500 population:						
Georgia (16 counties)	79	78	10.8	4.0	2.81	1,496
Michigan counties:						
Hillsdale	83	80	17.2	3.7	1.69	1,121
Crawford, Otsego, Roscommon	80	78	16.1	10.3	9.07	915
Missouri counties:						
Livingston, Linn	65	61	7.6	1.5	1.38	1,381
Howell	75	73	12.5	2.9	1.46	481
Purely rural:						
Georgia (16 counties)	77	76	8.5	3.0	2.62	4,459
Michigan counties:						
Hillsdale	73	70	12.3	4.3	1.69	4,139
Crawford, Otsego, Roscommon	70	67	15.5	5.8	4.97	1,248
Missouri counties:						
Livingston, Linn	55	54	5.7	1.2	0.63	5,058
Howell	59	55	7.8	1.8	0.52	2,091

* See footnotes, table 1.

relief had been received during that time. Persons in families[16] with annual incomes under $1,000 comprised about 40 percent of the surveyed group; about 65 percent were in families with annual incomes under $1,500; and 80 percent were in families with incomes under $2,000. Almost one-half of the lowest income group had been in receipt of relief during the year 1935. In table 3 has been given the frequency of illnesses disabling for a week or more according to the income and relief status of the family. The excess in the relief group over the rate in the group with incomes of $5,000 or more was 61 percent. There was also a definite excess for the nonrelief group with incomes below $1,000.

TABLE 8.—*Percentage of disabling illnesses receiving various types of doctor's care, by economic status and size of city. Urban, white* *

Annual family income and relief status	Size of city: All sizes	100,000 and over	25,000 to 100,000	Under 25,000
DOCTOR'S CARE: TOTAL				
All incomes	81	83	79	75
Relief	78	81	76	70
Nonrelief:				
Under $1,000	78	80	77	73
$1,000 to $2,000	82	83	81	77
$2,000 to $3,000	85	87	83	81
$3,000 to $5,000	87	88	86	82
$5,000 and over	89	90	87	87
DOCTOR'S CARE: EXCLUSIVE OF HOSPITAL CARE				
Total:				
All incomes	75	75	75	72
Relief	70	71	72	68
Nonrelief:				
Under $1,000	72	75	73	71
$1,000 to $2,000	76	76	77	74
$2,000 to $3,000	80	81	79	77
$3,000 to $5,000	82	83	81	78
$5,000 and over	84	85	83	81
Home:				
All incomes	53	52	57	54
Relief	47	45	52	49
Nonrelief:				
Under $1,000	50	48	54	53
$1,000 to $2,000	55	54	59	55
$2,000 to $3,000	60	60	60	58
$3,000 to $5,000	64	64	65	60
$5,000 and over	69	69	69	70
Public clinic:				
All incomes	5.2	6.4	3.4	1.3
Relief	12.3	15.1	10.5	1.6
Nonrelief:				
Under $1,000	4.2	5.9	1.9	1.2
$1,000 to $2,000	2.9	3.6	.8	1.8
$2,000 to $3,000	2.0	2.3	.8	1.1
$3,000 to $5,000	1.5	1.6	.4	2.0
$5,000 and over	.9	1.0	.1	.6
TOTAL NUMBER OF ILLNESSES				
All incomes	367,257	252,205	55,810	59,242
Relief	85,029	58,246	13,307	13,476
Nonrelief:				
Under $1,000	82,986	50,632	15,055	17,299
$1,000 to $2,000	136,114	96,258	19,435	20,421
$2,000 to $3,000	40,057	29,637	5,007	5,413
$3,000 to $5,000	15,838	11,793	2,071	1,974
$5,000 and over	7,233	5,639	935	659

* See footnotes *a* through *g*, table 1.

[16] For the purpose of this comparison, all persons living in a household are classified according to the total income of the related members of that household. See appendix table C, Perrott, Tibbitts, and Britten, op. cit., for detailed distributions of persons by annual family income, color, and sex.

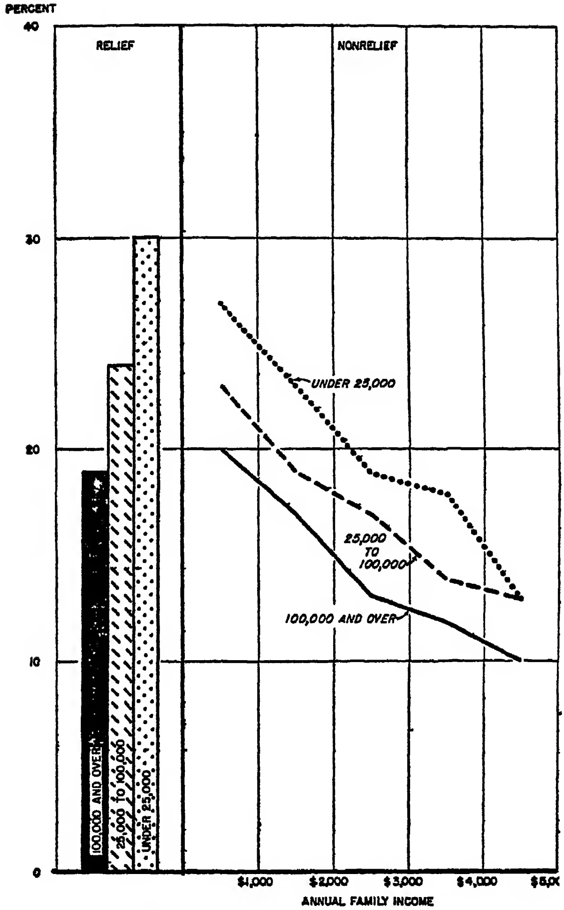

FIGURE 1.—Percentage of illnesses disabling for a week or longer which did *not* receive medical care.

The percentage of illnesses which received medical attention varied markedly with income and also with size of city for the same income group. The relation, expressed as the percentage of cases which did *not* receive such care, is shown in figure 1. As income rises there is a general tendency toward a decrease in the proportion of cases *not* medically attended. The percentage of disabling illnesses receiving various types of doctor's care is given in table 8 by economic status and size of city. One of the major facts brought out by the table is that clinic facilities, which supplement "home or office" medical care in large cities, are less adequately provided in small cities.

In table 9 is shown the number of doctor's calls per case attended by a doctor, classified by economic status and size of city. It will be observed that the amount of care per patient treated by a doctor in the lower economic status groups (especially the relief) was below the

averages for the higher income groups. This tendency was true in each city-size group; and it was true of "home" calls as well as of "total" calls.

TABLE 9.—*Doctor's calls per case of disabling illness receiving the specified care, by economic status and size of city. Urban, white* *

Annual family income and relief status	Size of city			
	All sizes	100,000 and over	25,000 to 100,000	Under 25,000
TOTAL CALLS PER CASE				
All incomes	7.4	7.5	7.4	7.
Relief	6.8	7.0	6.6	6.4
Nonrelief:				
Under $1,000	7.9	8.1	8.0	7.5
$1,000 to $2,000	7.2	7.2	7.4	7.0
$2,000 to $3,000	7.6	7.6	7.4	7.7
$3,000 to $5,000	8.0	8.9	8.1	8.0
$5,000 and over	9.2	9.3	9.0	9 5
HOME CALLS PER CASE				
All incomes	5.9	5.9	5.7	5.9
Relief	4.8	4.7	4.8	5.1
Nonrelief:				
Under $1,000	6.3	6.4	6.2	6.1
$1,000 to $2,000	5.8	5.8	5.7	5 8
$2,000 to $3,000	6.3	6.2	6.0	6 5
$3,000 to $5,000	6.7	6.7	6.4	7.0
$5,000 and over	8.3	8.1	8.2	9.3

* See footnotes *a*, *b*, *d*, *e*, and *f*, table 1.

In the interpretation of the figures relating to medical care received by the surveyed families on relief, it should be noted that a relatively large volume of medical care was provided with the aid of Federal relief funds in 1935, the approximate survey year. In the fall of 1935, Federal sub. idies for medical relief were discontinued.

Turning now to hospital care, even sharper differences are noted by size of city in the low-income groups than in the preceding comparisons (see fig. 2). Although in the income group of $5,000 and over the percentage of illnesses disabling for a week or longer which were hospitalized was about the same in each city-size group, the curves diverge widely as the lower income levels are reached. The maximum difference is shown for the relief group. In this group twice as large a proportion of the illnesses under consideration were hospitalized in cities with 100,000 or more population as in cities with populations below 25,000. The data are presented in table 10, which also gives the days in hospital per hospital case by size of city and economic status. Relief and low-income (under $1,000) groups show a somewhat greater average stay in hospital; the average is somewhat greater in larger cities than in small.

TABLE 10.—*Hospital care received for disabling illnesses, by economic status and size of city. Urban, white* *

Annual family income and relief status	Size of city			
	All sizes	100,000 and over	25,000 to 100,000	Under 25,000
PERCENTAGE OF CASES HOSPITALIZED				
All incomes	27	30	23	19
Relief	27	31	21	15
Nonrelief:				
Under $1,000	25	29	21	17
$1,000 to $2,000	28	30	25	21
$2,000 to $3,000	29	31	26	2[illegible]
$3,000 to $5,000	29	30	28	26
$5,000 and over	31	32	30	31
DAYS IN HOSPITAL PER HOSPITAL CASE				
All incomes	19	20	17	18
Relief	24	24	21	22
Nonrelief:				
Under $1,000	21	22	18	19
$1,000 to $2,000	17	17	15	16
$2,000 to $3,000	16	16	13	14
$3,000 to $5,000	15	15	15	18
$5,000 and over	16	16	14	14

* See footnotes *a* and *d*, table 1.

In table 11 are presented the percentages of illnesses disabling for a week or longer which received nursing services and the services per attended case. Bedside nursing care by a private duty nurse was received for only a small proportion of illnesses in relief families (0.9 percent in cities of 100,000 or more population; 1.5 percent in cities of 25,000 to 100,000; and 1.9 percent in cities under 25,000 population). The percentages rose rapidly with income (for the group with incomes of $5,000 or more the percentages were, respectively, 15.8, 20.4, and 17.8). In the case of services by a visiting nurse, the reverse was naturally true; however, the relatively greater amount of visiting nurse service in relief and low-income families in no sense compensates for the low volume of continuous bedside nursing care, a type of nursing service which should be available during the acute stages of many diseases. This point is well brought out by consideration of the services per case receiving the specified care. A visiting nurse made about 5 visits to the average illness disabling for a week or longer which she attended; but the days of nursing service for the cases attended by the private duty nurse averaged 26. The figures also bring out a striking difference by income in the average days of private duty nursing service. For the relief group, the average number of days was 19, whereas it was 42 for the group with incomes of $5,000 or more. A similar tendency is apparent for each city-size group.

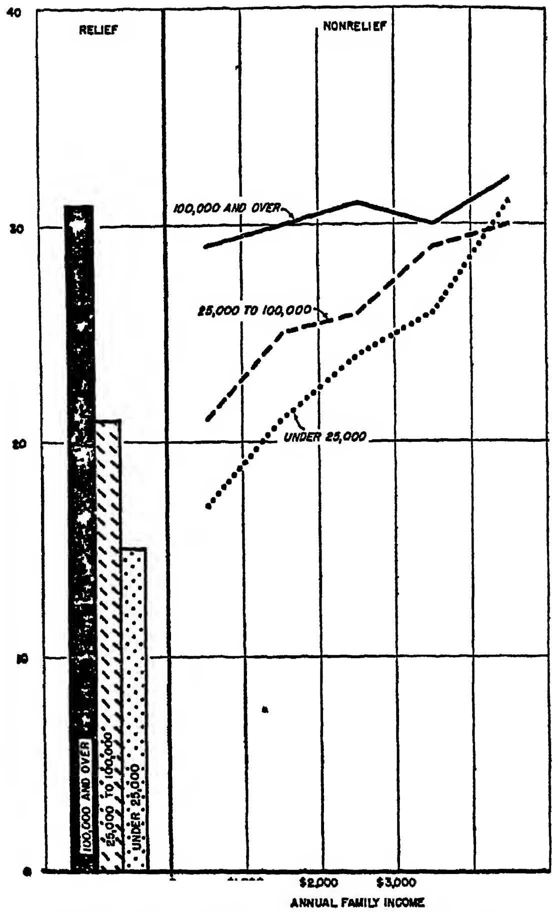

FIGURE 2.—Percentage of illnesses disabling for a week or longer which were hospitalized.

Because of the widely different medical needs associated with acute and with chronic illnesses, it seems desirable to consider the relative adequacy of medical care (as measured by changes with economic status) for these two groups of illnesses. Diseases the symptoms of which had been observed for 3 months or longer have been regarded as "chronic" for this purpose. Table 12 gives the percentage of acute and of chronic illnesses which were attended by a doctor and which were hospitalized, in the different economic status groups. (See also tables 16 and 17.)

TABLE 11.—*Nursing service received for disabling illnesses, by economic status and size of city. Urban, white**

Annual family income and relief status	Size of city			
	All sizes	100,000 and over	25,000 to 100,000	Under 25,000
PERCENTAGE OF CASES RECEIVING PRIVATE DUTY NURSING CARE				
All income	3.8	3.4	4.8	4.4
Relief	1.2	9	1.5	1.9
Nonrelief:				
Under $1,000	2.9	2.5	3.6	3.5
$1,000 to $2,000	3.9	3.3	5.4	5.2
$2,000 to $3,000	6.4	5.9	8.1	7.5
$3,000 to $5,000	9.2	8.5	13.4	8.9
$5,000 and over	16.6	15.8	20.4	17.8
DAYS OF NURSING PER PRIVATE DUTY NURSE CASE				
All income	26	29	21	23
Relief	19	18	26	17
Nonrelief:				
Under $1,000	24	27	20	23
$1,000 to $2,000	23	26	19	21
$2,000 to $3,000	27	29	21	24
$3,000 to $5,000	30	32	21	36
$5,000 and over	42	45	33	39
PERCENTAGE OF CASES RECEIVING VISITING NURSING CARE				
All income	7.0	7.7	4.7	6.0
Relief	11.8	13.2	8.5	9.3
Nonrelief:				
Under $1,000	6.0	6.7	3.9	5.5
$1,000 to $2,000	6.0	6.5	3.7	5.5
$2,000 to $3,000	4.6	5.1	2.7	3.3
$3,000 to $5,000	3.3	3.6	1.8	3.1
$5,000 and over	2.7	3.0	1.2	2.0
VISITS PER VISITING NURSE CASE				
All income	5.3	5.2	6.5	5.2
Relief	5.5	5.6	5.6	4.9
Nonrelief:				
Under $1,000	6.0	5.9	7.6	5.2
$1,000 to $2,000	4.8	4.0	6.5	5.1
$2,000 to $3,000	[illegible]	[illegible]	7.9	7.4
$3,000 to $5,000	4.1	3.8	8.1	4.1
$5,000 and over	6.7	6.2	15.3	5.9

* See footnotes *a* and *h*, table 1.

AGE

Although separate reports show the rates of illness and medical care received in the various major age groups of the population (children, youths, early and middle-aged adults, the aged),[17] a summary

[17] The disabling diseases of childhood. Their characteristics and medical care as observed in 500,000 children in 83 cities canvassed in the National Health Survey, 1935–36. By Dorothy F. Holland. I. Characteristics and leading causes. Pub. Health Rep., 55: 135–156 (Jan 26, 1940). II. Medical and nursing care. Pub. Health Rep., 55: 227–244 (Feb. 9, 1940).

TABLE 12.—*Percentage of acute and of chronic [1] illnesses disabling for a week or longer which received doctor's or hospital care, by economic status. Urban, white**

Annual family income and relief status	Doctor				Hospital		Total number of illnesses	
	Total		Exclusive of hospital care					
	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
All income	78	89	72	83	25	35	267,577	99,680
Relief	75	87	66	80	24	34	59,864	25,165
Nonrelief:								
Under $1,000	75	86	68	81	22	30	56,795	26,191
$1,000 to $2,000	79	91	73	85	26	36	103,338	32,776
$2,000 to $3,000	83	93	78	88	26	38	30,296	9,761
$3,000 to $5,000	85	93	80	88	26	40	11,980	3,858
$5,000 and over	87	94	83	89	27	43	5,304	1,929

* See footnotes *a* through *e*, table 1.
[1] "Chronic" refers to illnesses the symptoms of which had been observed for 3 months or more.

of such findings is desirable here. In table 13 is given the percentage, in four broad age groups, of illnesses disabling for a week or longer which received various types of medical care, and in table 14 the services per case receiving the specified types of care. In any interpretation of these averages, it must be kept in mind that the nature and severity of any given case of illness, and hence the medical care requirements for it, vary greatly with age.[18]

Table 13 indicates that the percentage of cases (of the type specified) receiving medical attention was at a maximum in the age group 25–64 and at a minimum in childhood. However, the relations are by no means the same for the different types of care, as is shown in the following summary:

	Percentage is least in age group	*Percentage is greatest in age group*
Private duty nursing service	Under 15	65 and over
Doctor's care (excluding hospital care)	Under 15	65 and over
Any medical care	Under 15	25–64
Hospital care	Under 15	15–24
Doctor's home care	15–24	65 and over
Public clinic	65 and over	Under 15
Visiting nursing	65 and over	Under 15

The contrast is most marked in the case of nursing. Among children only 1.3 percent of illnesses received private duty nursing care, whereas among persons over 65 the percentage was 7.1; for visiting nursing these percentages were reversed, being 13.2 and 3.1, respectively.

The services per case (table 14) reflect primarily the increasing severity of the individual case of illness as age advances. Each of the five indices used is at a maximum in the age groups 65 and over and each shows a rapid rise with age.

[18] The frequency and days of disability per person and per case are given for the four age groups in table 2. As to diagnosis, there is a gradual shift from acute to chronic diseases as age increases, implying a change in the character of medical care needs.

TABLE 13.—*Percentage of disabling illnesses receiving various types of medical care, by age. Urban, white* *

Age (years)	Doctor				Hospital	Nursing		Total number of illnesses
	Total	Exclusive of hospital care				Private duty	Visiting	
		Total	Home	Public clinic				
All ages	81	75	53	5.2	27	3.8	7.0	367,257
Under 15	72	68	51	6.2	17	1.3	13.2	116,347
15-24	84	73	48	4.2	40	3.5	6.5	48,930
25-64	86	79	53	5.0	33	4.9	4.4	167,129
65 and over	83	80	66	3.5	18	7.1	3.1	34,851

* See footnotes, table 1.

Among the many factors entering into the differences in medical care at various ages is economic status. By way of illustration, table 15 gives the percentage of illnesses disabling for a week or more which received medical care, by age and economic status. Although in the higher income groups there is a tendency for the percentage to rise gradually with age (reflecting the increasing severity of the illnesses), this tendency is not consistently maintained for the relief and low-income groups, in which persons over 65 years of age show a lower percentage than other adults. Children, who in the higher income groups showed only a slightly lower percentage than youths, had in the relief and low-income group a very much lower percentage.

TABLE 14.—*Services per case receiving specified type of medical care, by age. Urban, white* *

Age (years)	Doctor		Hospital (days)	Nursing	
	Exclusive of hospital care			Private duty (days)	Visiting (visits)
	Total (calls)	Home (calls)			
All ages	7.4	5.9	19	26	5.3
Under 15	4.4	3.9	14	16	3.2
15-24	6.3	4.7	16	12	5.5
25-64	8.9	6.5	21	22	8.1
65 and over	10.8	9.6	29	56	14.0

* See footnotes *a*, *b*, *d*, *e*, *f* and *h*, table 1.

DIAGNOSIS

The medical needs of the sick vary with the cause of illness. Hence, in table 16 is shown, for selected diagnoses,[19] the percentage of disabling illnesses receiving various types of medical care by the diagnosis

[19] Excluded from these comparisons are tuberculosis and nervous and mental diseases (these diagnoses are particularly affected by the conditions described in footnote 4), pneumonia, and confinements (special reports are being prepared), and a few other diagnoses of relatively infrequent occurrence.

(sole or primary) of the illness, and in table 17 the services per case receiving the specified type of care, similarly classified. The relative frequency of different causes, including those under consideration here, has already been given (table 4).[20]

TABLE 15.—*Percentage of disabling illnesses receiving doctor's care (inclusive of hospital care), by age and economic status. Urban, white* *

Age (years)	Annual family income and relief status						
	All incomes	Relief	Nonrelief				
			Under $1,000	$1,000 to $2,000	$2,000 to $3,000	$3,000 to $5,000	$5,000 and over
PERCENTAGE OF ILLNESSES							
All ages	81	78	78	82	85	87	89
Under 15	72	70	67	72	78	82	85
15-24	84	83	83	85	86	87	88
25-64	86	84	82	87	90	89	91
65 and over	83	78	80	86	87	90	92
TOTAL NUMBER OF ILLNESSES							
All ages	367, 257	85, 029	82, 986	136, 114	40, 057	15, 838	7, 233
Under 15	110, 347	31, 067	21, 173	44, 527	12, 777	4, 694	2, 109
15-24	48, 930	11, 614	12, 246	17, 838	4, 584	1, 862	786
25-64	167, 129	35, 440	37, 607	63, 120	19, 512	7, 962	3, 438
65 and over	34, 851	6, 908	11, 960	10, 629	3, 184	1, 320	850

* See footnotes *a*, *b*, and *c*, table 1.

The proportion of cases *not* receiving medical attention varied from about 38 percent for communicable diseases, colds, influenza, etc., to about 6 percent for tonsillitis (including tonsillectomies), digestive diseases, accidents, and degenerative diseases. The percentages are shown graphically in figure 3. It is clear that the nature of the disease plays an important part in determining the extent to which medical care is received.

The proportion of cases of any given disease which were hospitalized varied from 51 for tonsillitis and tonsillectomies to 4 for colds, influenza, etc. The relatively high proportions for certain diagnoses reflect surgical procedures, which are usually carried out in the hospital. It may be mentioned that appendicitis and appendectomies (included in the digestive group) were notable in that 88 percent of the cases were hospitalized.

[20] The diagnoses shown in tables 16-19 correspond to those on certain lines of table 4, as follows: Communicable diseases, 1, 2; rheumatism and allied diseases, 5; degenerative diseases, 4, 6, and 21; tonsillitis, 11; colds, influenza, etc., 12; diseases of digestive system, 13-16; accidents, 26; orthopedic impairments, 27.

TABLE 16.—*Percentage of disabling illnesses receiving various types of medical care, by diagnosis (sole or primary). Urban, white* *

Diagnosis	Doctor				Hospital	Nursing		Total number of illnesses
	Total	Exclusive of hospital care				Private duty	Visiting	
		Total	Home	Public clinic				
All diagnoses	81	75	53	5.2	27	3.8	7.0	367,257
Selected diagnoses:								
Communicable diseases	62	61	52	6.0	5.0	1.1	16.2	65,320
Rheumatism and allied diseases	81	79	55	6.9	12	2.0	2.9	11,997
Degenerative diseases	94	89	69	5.3	25	6.2	3.6	28,968
Tonsillitis (including tonsillectomies)	93	82	40	3.6	51	1.4	4.7	21,952
Colds, influenza, etc.	64	63	51	3.8	4.1	1.3	2.8	75,071
Diseases of digestive system	94	88	63	3.6	56	7.1	3.3	27,156
Accidents	94	86	44	8.9	36	2.6	2.5	33,493
Orthopedic impairments	69	64	39	7.1	23	3.9	4.1	6,161

* See footnotes, table 1.

Cases of communicable diseases showing nursing visits (16.2 percent of 65,320 cases) amounted to 41 percent of the total number of visiting nurse cases.

TABLE 17.—*Services per case receiving specified types of medical care, by diagnosis (sole or primary). Urban, white* *

Diagnosis	Doctor		Hospital (days)	Nursing	
	Exclusive of hospital care			Private duty (days)	Visiting (visits)
	Total (calls)	Home (calls)			
All diagnoses	7.4	5.9	19	26	5.3
Selected diagnoses:					
Communicable diseases	4.1	3.6	25	20	2.8
Rheumatism and allied diseases	11.1	8.5	37	67	13.3
Degenerative diseases	12.7	10.6	28	44	11.8
Tonsillitis (including tonsillectomies)	3.0	2.8	2.3	3.7	2.6
Colds, influenza, etc.	4.3	3.6	18	16	4.1
Diseases of digestive system	7.4	5.5	16	16	5.1
Accidents	9.2	6.5	18	34	9.0
Orthopedic impairments	17.3	13.5	56	146	22.0

* See footnotes *a*, *b*, *d*, *e*, *f*, and *h*, table 1.

Services per case (see table 17) vary widely depending on the severity of the disease and other factors. Since, with respect to the volume of service, it is of particular interest to consider the part of the load absorbed by any given diagnosis, an additional table (No. 18) is introduced to indicate the percentage of doctor's calls and of hospital days associated with each of the selected diagnoses under consideration.

TABLE 18.—*Percentage distribution of doctor's calls and of hospital days by diagnosis. Urban, white* *

Diagnosis	Doctor's calls	Hospital days
All diagnoses	100.0	100.0
Selected diagnoses:		
Communicable diseases	8.0	4.2
Rheumatism and allied diseases	4.9	2.8
Degenerative diseases	16.1	10.7
Tonsillitis (including tonsillectomies)	2.7	1.3
Colds, influenza, etc	10.5	2.9
Diseases of digestive system	8.9	12.8
Accidents	12.8	11.4
Orthopedic impairments	3.2	4.2

* See footnotes *a*, *d*, and *e*, table 1.

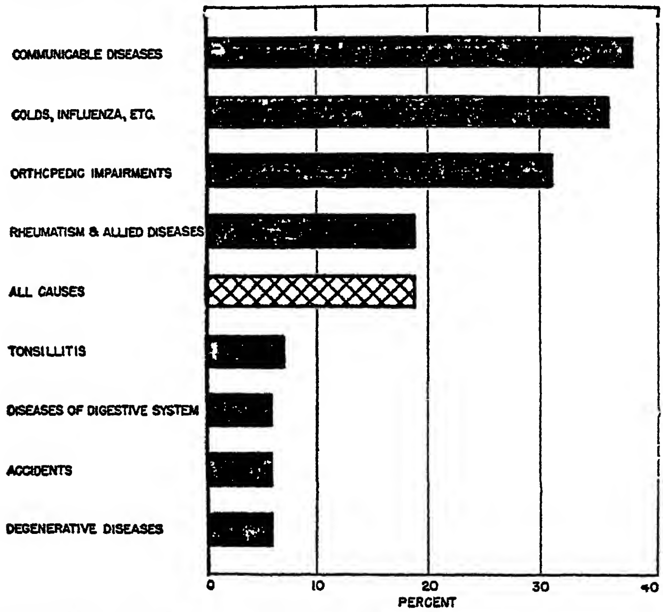

FIGURE 3.—Proportion of disabling illnesses due to certain selected diagnoses (sole or primary) which did *not* receive doctor's care.

A further table (No. 19) gives the percentage of disabling illnesses receiving doctor's care by diagnosis and economic status. The difference between the percentages which did receive care for the relief group and the group with incomes of $3,000 and more are as follows:

Communicable diseases	20
Colds and influenza	18
Rheumatism	11
Orthopedic impairments	10
All diagnoses	10
Digestive diseases	7
Tonsillitis	6
Degenerative diseases	6
Accidents	3

TABLE 19.—*Percentage of disabling illnesses receiving doctor's care (inclusive of hospital care) by diagnosis and economic status. Urban, white* *

Diagnosis	Average duration of disability per case (days)	Annual family income and relief status					
		All incomes	Relief	Nonrelief			
				Under $1,000	$1,000 to $2,000	$2,000 to $3,000	$3,000 and over
PERCENTAGE RECEIVING DOCTOR'S CARE							
All diagnoses	56	81	78	78	82	85	88
Selected diagnoses:							
Communicable diseases	23	62	59	56	62	70	79
Rheumatism and allied diseases	124	81	78	76	85	87	89
Degenerative diseases	123	94	91	92	95	96	97
Tonsillitis (including tonsillectomies)	14	93	90	90	94	96	96
Colds, influenza, etc	24	64	58	57	65	72	76
Diseases of digestive system	59	94	92	92	96	98	99
Accidents	49	94	93	92	95	96	96
Orthopedic impairments	305	69	67	67	70	74	77
TOTAL NUMBER OF ILLNESSES							
All diagnoses		367, 257	85, 029	82, 986	136, 114	40, 057	23, 071
Selected diagnoses:							
Communicable diseases		65, 320	16, 273	12, 616	25, 616	7, 117	3, 698
Rheumatism and allied diseases		11, 997	3, 079	3, 279	3, 883	1, 155	601
Degenerative diseases		28, 568	6, 687	7, 750	9, 623	2, 964	1, 844
Tonsillitis (including tonsillectomies)		21, 952	5, 035	4, 072	8, 716	2, 702	1, 407
Colds, influenza, etc		75, 671	15, 455	16, 540	28, 067	9, 334	6, 275
Diseases of digestive system		27, 156	5, 873	6, 274	9, 885	3, 173	1, 952
Accidents		33, 493	6, 871	8, 200	12, 709	3, 652	2, 061
Orthopedic impairments		6, 161	1, 674	1, 853	1, 850	506	278

* See footnotes *a*, *b*, and *c*, table 1.

The wide variation in the rates of hospitalization in cities of different sizes makes it important to determine how such differentials obtain in the case of certain diagnoses. Table 20 relates these differences to economic status. In general the proportion of cases hospitalized falls off as the city becomes smaller, but the changes are more marked for some diseases (especially the communicable group) than for others.

COLOR

A comparison is given in tables 21 and 22 of the extent and type of medical care received by the colored population in comparison with that received by the white population. The same indices are used as in the preceding tables. In the South the data are given separately for the three city-size groups (over 100,000,[21] 25,000 to

[21] Baltimore, the only city in the South with more than 500,000 population, was surveyed but has been excluded from the general reports, since the sample (which, for a special purpose, was limited to the eastern and western health districts) did not give a representative cross-section of the city.

100,000, and under 25,000). In other parts of the country comparison is limited to cities over 500,000 population, because of the relatively small colored populations in smaller cities. The West has been excluded from these comparisons because of the fact that the colored population in the West differs in composition from that in the rest of the country. The present analysis is essentially a comparison between white and Negro populations.[22]

TABLE 20.—*Percentage of cases hospitalized by economic status, size of city, and diagnosis*

Diagnosis and size of city	Annual family income and relief status			
	Relief	Nonrelief		
		Under $1,000	$1,000 to $2,000	$2,000 and over
All diagnoses:				
100,000 and over	31.5	28.9	30.3	30.7
25,000 to 100,000	21.1	20.6	24.9	27.1
Under 25,000	14.8	16.7	21.4	25.3
Selected diagnoses:				
Communicable diseases:				
100,000 and over	10.7	7.7	5.1	4.7
25,000 to 100,000	4.0	3.0	2.2	2.5
Under 25,000	1.0	1.4	1.5	2.1
Rheumatism and allied diseases:				
100,000 and over	15.5	11.8	11.7	13.6
25,000 to 100,000	11.7	8.3	9.4	15.9
Under 25,000	6.9	7.1	10.8	12.7
Degenerative diseases:				
100,000 and over	33.1	25.1	26.7	26.0
25,000 to 100,000	19.5	17.2	22.3	29.8
Under 25,000	16.0	14.6	20.4	28.3
Colds, influenza, etc.:				
100,000 and over	5.6	5.2	3.9	3.9
25,000 to 100,000	3.3	2.8	3.5	4.5
Under 25,000	2.2	2.4	2.9	5.5
Tonsillitis (including tonsillectomies):				
100,000 and over	57.7	52.9	53.4	57.6
25,000 to 100,000	36.9	29.0	36.6	45.0
Under 25,000	31.3	37.2	44.3	53.0
Diseases of digestive system:				
100,000 and over	50.1	51.6	60.2	68.0
25,000 to 100,000	39.6	43.1	56.1	65.0
Under 25,000	37.8	42.0	58.9	65.8
Accidents:				
100,000 and over	42.6	35.4	36.1	35.5
25,000 to 100,000	34.7	34.5	39.0	41.3
Under 25,000	27.4	28.5	31.7	33.8
Orthopedic impairments:				
100,000 and over	26.6	19.6	24.7	26.1
25,000 to 100,000	21.1	22.6	27.5	30.4
Under 25,000	14.6	17.4	23.3	27.0

The major fact brought out in table 21 is the relative lack among the Negro population of hospital care (especially in the smaller cities in the South) and of private duty nursing. In contrast is the greater

[22] In the Northeast and North Central areas "Negro" includes a negligible proportion of "other colored."

proportion among Negroes of cases receiving care in public clinics (except in the smaller cities in the South) and from visiting nurses.[23]

TABLE 21.—*Percentage of disabling illnesses receiving various types of medical care, by color, geographic area, and size of city. Urban* *

Color	Doctor				Hospital	Nursing	
	Total	Exclusive of hospital care				Private duty	Visiting
		Total	Home	Public clinic			
SOUTH: CITIES OF 100,000 AND OVER							
White	83	77	57	5.7	31	5.2	3.8
Negro	81	72	48	16.1	23	.7	8.2
SOUTH: CITIES OF 25,000 TO 100,000							
White	79	75	55	3.6	25	6.3	2.1
Negro	73	71	55	1.3	11	.7	2.2
SOUTH: CITIES OF UNDER 25,000							
White	78	76	63	.8	19	5.2	2.2
Negro	77	76	60	.4	8	1.1	2.7
NORTHEAST: CITIES OF 500,000 AND OVER							
White	87	76	54	7.4	31	3.1	7.9
Negro **	86	76	46	17.6	31	.5	11.1
NORTH CENTRAL: CITIES OF 500,000 AND OVER							
White	86	77	54	9.1	32	2.9	10.2
Negro **	87	75	51	22.8	29	.5	15.0

* See footnotes, table 1.
** Includes a negligible proportion of "other colored."

[23] In the rural areas surveyed (see footnote 15) adequate data for Negroes were obtained only for the 16 counties of Georgia. The percentage of disabling illnesses receiving various types of medical care was:

Community and color	Doctor		Hospital	Nursing		Total number of illnesses
	Total	Exclusive of hospital care		Private duty	Visiting	
Towns and villages under 2,500 population:						
White	79	78	10.8	4.0	2.51	1,496
Negro	64	64	2.4	1.2	3.25	585
Purely rural:						
White	77	76	8.5	3.0	2.62	4,459
Negro	64	64	1.7	0.6	4.11	3,477

The major differences are relatively lower rates of hospitalization and receipt of private duty nursing care among Negroes and relatively higher rate of visiting nurse care.

TABLE 22.—*Services per case receiving various types of medical care, by color, geographic area, and size of city. Urban* *

Color	Doctor: Exclusive of hospital care: Total (calls)	Doctor: Exclusive of hospital care: Home (calls)	Hospital (days)	Nursing: Private duty (days)	Nursing: Visiting (visits)
SOUTH: CITIES OF 100,000 AND OVER					
White	7.9	6.1	16	24	6.6
Negro	6.9	5.1	18	24	6.7
SOUTH: CITIES OF 25,000 TO 100,000					
White	7.7	5.7	15	18	4.4
Negro	5.1	3.9	24	14	4.5
SOUTH: CITIES OF UNDER 25,000					
White	7.9	6.0	17	19	4.9
Negro	5.7	4.9	21	15	4.6
NORTHEAST: CITIES OF 50,000 AND OVER					
White	7.9	6.7	21	31	6.1
Negro [a]	7.7	5.4	24	11	5.8
NORTH CENTRAL: CITIES OF 500,000 AND OVER					
White	7.5	5.5	20	25	4.7
Negro [a]	6.3	4.2	27	16	5.4

* See footnotes, *a, b, d, e, f, h,* and *i*, table 1.
[a] Includes a negligible proportion of "other colored."

The most significant point to be noted in table 22 is the longer period of hospitalization per hospitalized case among the Negro population. For the other types of medical care the services per case tend to be greater for the white population.

SUMMARY

The foregoing report summarizes information on the receipt of medical care collected in a house-to-house canvass of more than 700,000 urban families (2,500,000 persons) in 18 States, made from November 1935 to March 1936. The data relate to care received for illnesses resulting from disease, accidents, and impairments which kept persons from work, school, home duties, or usual pursuits for a week or longer during the 12 months immediately preceding the visit. Persons in hospitals or other institutions for the care of disease for the entire 12-month period have been excluded. With the exception of a few comparisons between white and colored persons, the material presented has been restricted to white households.

The percentage of illnesses which received medical attention varied markedly with income and also with size of city for the same income group. As income rose there was a general tendency toward an increase in the proportion of cases medically attended. Free hospital and clinic facilities, which supplement "home or office" medical care in large cities, were less adequately provided in small cities.

The amount of care per patient treated by a doctor in the lower economic status groups (especially the relief) was below the averages for the higher income group. This tendency was true in each city-size group; and it was true of "home" calls as well as of "total" calls.

Although in the income group of $5,000 and over the percentage of illnesses disabling for a week or longer which were hospitalized was about the same in each city-size group, the curves diverged widely as the lower incomes were reached, the maximum difference being shown for the relief group. In this group twice as large a proportion of the illnesses were hospitalized in cities with populations of 100,000 and over as in cities with populations below 25,000.

Bedside nursing care by a private duty nurse was received for only a small proportion of illnesses in relief families, the percentages rising rapidly with increasing income. The reverse was true in the case of services by a visiting nurse.

The percentage of illnesses receiving medical care was at a maximum in the age group 25–64 and at a minimum in childhood. However, the relations were by no means the same for the different types of care. Services per case reflected particularly the increasing severity of the individual case of illness as age advanced.

Although in the higher income groups there was a tendency for the percentage of illnesses receiving medical care to rise gradually with age (again reflecting the increasing severity of the illness), this tendency was not consistently maintained for the relief and low-income groups, in which persons over 65 years of age showed a lower percentage than other adults. Children, who in the higher income groups showed only a slightly lower percentage than youths, had in the relief and low-income groups a very much lower percentage.

The amount and type of medical care received varied with the nature of the disease, the proportion of disabling illnesses not receiving care varying from about 38 percent for communicable diseases, colds, influenza, etc., to about 6 percent for tonsillitis (largely tonsillectomies), diseases of the digestive system, accidents, and degenerative diseases.

There was a relative lack of private duty nursing and hospital care among the Negro population, especially in the smaller cities in the South; and a greater proportion of Negroes received care in public clinics and from visiting nurses.

Broadly speaking, the survey shows that a large proportion of the urban population had incomes that left no margin or only a small margin for meeting the costs of medical care; that the illness rates were highest in the groups least able to meet such costs; that, in general, persons at the lowest economic levels received the least medical care; that such persons residing in smaller cities were at a particular disadvantage compared with those in larger cities, especially with respect to hospitalization.

COLORADO TICK FEVER

By Norman H. Topping, *Passed Assistant Surgeon, National Institute of Health, United States Public Health Service*, James S. Cullyford, *Director, Division of Epidemiology and Local Health Work, Colorado State Department of Public Health*, and Gordon E. Davis, *Bacteriologist, Rocky Mountain Laboratory, United States Public Health Service*

More or less widespread throughout the world is a group of diseases the exact nature of which is not clearly understood. These diseases are reputedly transmitted by one of the arthropods, usually a tick, and include, among others, South African tick fever (*1*), Kenya typhus (*2*), and Colombian spotted fever (*3*). To this group has been added, by those interested in this field, a febrile illness to which has been applied the name, "Colorado tick fever." Locally the disease has been known by several names, "mountain fever," "tick fever," "mountain tick fever," etc. Toomey reviewed the older literature in three articles entitled "American Mountain Tick Fever" (*4*) published in 1931 and 1932. However, his articles were preceded by Becker's studies in 1930 (*5*, *6*), in which he gave the disease its present name and described some of its symptoms.

The present study was instituted in Boulder, Colo., during the tick season of 1940. Its objects were to study clinically the cases occurring in and about Boulder, to make certain epidemiological observations, and, finally, to attempt isolation of the causative agent from the afflicted individuals.

CLINICAL OBSERVATIONS

During the period May 6 to June 4, 1940, all cases of Colorado tick fever reported to the United States Public Health Service field laboratory in Boulder were investigated. The disease is well understood by the practicing physicians of Boulder and a surprisingly small number of cases in which the diagnosis could not be supported were reported to us. During the month 11 cases of Colorado tick fever were studied. Much of the pertinent clinical data is summarized in table 1.

TABLE 1.—*Summary of clinical data on cases of Colorado tick fever*

Patient number	Age	Sex	Previous history tick bite	Date tick removed, 1940	Date onset, 1940	Duration first febrile period, in days	Duration of remission, in days	Duration of relapse, in days	Height of recorded fever, first period	Height of recorded fever on relapse	Symptoms	White blood count	Date of white blood count, 1940
									°	°			
9	6	♀	Multiple +.	May 3[1]	May 6	2	2	1	102.6	99.6	Headache, photophobia, chills, nausea, vomited once.	4,500	May 8
11	17	♂	One +...	May 4	May 8	3	1½	1½	103	102	Headache, chills, muscle pains.	4,400	May 9
13	25	♀	One +...	May 6	May 7	1	3	2	101	103	Headache, chills, backache, hyperesthesia of skin.	2,500 2,100 9,300	May 11 May 12 May 22
14	61	♂	One +...	May 11	May 11	2	3	2	101	101	Headache, chilly sensation, muscle pain, backache.	4,300	May 12
15	38	♀	One +...	May 6	May 10	2	3	2	102.4	101	Headache, backache, photophobia, hyperesthesia of skin.	-----	
16	11	♂	One +...	May 14[2]	May 19	2	3	1	102	101	Headache, chilly sensations.	4,100	May 20
17	54	♀	One +...	May 14	May 14	2	2	2	99.5	103	Headache, backache, chilly sensations.	-----	
24	55	♂	Multiple +.	May 15, May 20, May 21	May 21	3	2	2	101	102	Headache, muscle pain, abdominal pain.	1,300	May 27
25	10	♀	One +...	May 23	May 28	2	2	1	101	100	Chilly sensations, pains in legs.	2,700	May 30
26	34	♂	Multiple (?).	(?)	May 26	3	2	2	(?)	105	Headache, chills, muscle pains, photophobia.	1,300	May 31
27	13	♂	One +...	May 26[2]	May 30	2	2	1	102	99.6	Headache, photophobia, muscle pains.	-----	

[1] 3 removed. [2] 2 removed.

Several of these patients had only one history of exposure to ticks, while on either a picnic or a fishing trip. Patients 11, 15, and 16 were all on picnics in the foothills near Boulder. The following day a tick or ticks were found attached to their bodies. The onset of cases 11 and 15 occurred 4 days later, while onset of case 16 occurred 5 days later. Patient 27 was fishing in a canyon near Boulder on May 25; the following day two ticks were removed from his body and 4 days later, May 30, he developed Colorado tick fever. From these cases it would appear that the incubation period is about 4 or 5 days. There is only one case in the series that may have had a longer incubation period. This patient, No. 26, had been working in an area heavily infested with ticks and had had several tick bites, so that a definite history was impossible to obtain.

Prodromata in Colorado tick fever are very indefinite and in the 11 cases in this series not well established. The onset, in contradistinction, was sharp and clearly defined; it was not unusual for the patient to set the onset within an hour or so. The disease was usually ushered in with headache, backache, and chilly sensations. In several of the

patients there was some nausea and in one case, No. 9, there was vomiting. The temperature rose rapidly and was sustained for about 48 hours with a persistence of headache, backache, muscle pains, photophobia, and in several cases some hyperesthesia of the skin. There was usually a gradual fall in fever and a cessation of symptoms between 36 and 48 hours after onset. A period of remission then occurred, lasting 2 or 3 days, in which the patient had no complaints except perhaps slight weakness. At the end of this period there was a relapse, again with a sudden onset, and a recurrence of the previous symptoms lasting 24 to 48 hours and then rapidly disappearing. Figure 1 illustrates the typical febrile record in a case of Colorado tick fever. Following the relapse the patients not infrequently complained of great weakness and the convalescence seemed unusually long considering the relatively short duration of the fever.

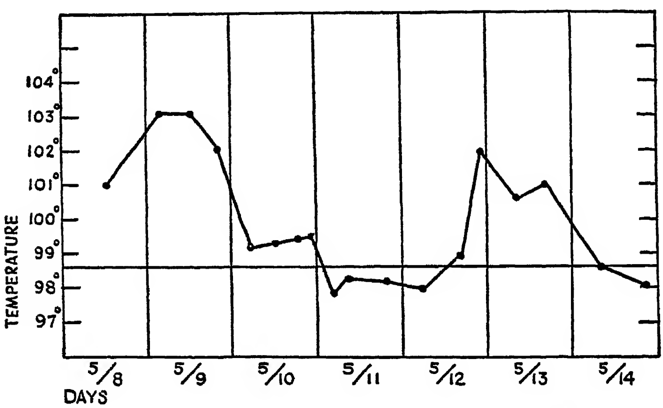

FIGURE 1.—Temperature record in Colorado tick fever, case 2.

During 1940 follow-up cards requesting additional information were sent to the physicians reporting cases of Colorado tick fever. The replies are summarized in tables 2 and 3. It is obvious that some of the cases were not Colorado tick fever as we know it; however, the majority of the cases conform to our conception of the disease.

TABLE 2.—*Incidence of symptoms in 53 cases of Colorado tick fever reported in Colorado in 1940* [1]

Symptoms	Number of cases	Symptoms	Number of cases
Fever	53	Vomiting	5
Headache	39	Malaise	5
Chills	30	Abdominal tenderness	[2] 7
Backache	20	Weakness	5
Muscle pain	17	Dizziness	2
General aches	17	Restlessness	2
Photophobia	14	Anorexia	1
Nausea	14	Diarrhea	1
Leg muscular pains	12	Abdominal rigidity	1

[1] 56 cards: 53 Colorado tick fever, 1 tick paralysis, 1 (?) rash, no remission, 1 "mistaken diagnosis."
[2] Five of these reported as splenic tenderness.

TABLE 3.—*Incidence of relapse, duration of febrile periods, and duration of remission in the 53 cases of Colorado tick fever reported in Colorado in 1940*

	Days	Cases
No relapse: 11 cases.		
Duration of single febrile period	2	2
	3	1
	4	1
	5	3
	7	1
	9	1
	16	1
	?	1
One relapse: 39 cases.		
Duration of first febrile period	2	14
	3	19
	4	4
	5	1
	7	1
Duration of remission	1	11
	2	24
	3	2
	4	1
	7	1
Duration of second febrile period	1	1
	2	14
	3	12
	4	3
	5	3
	7	1
	8	1
	11	1

Two relapses: 1 case (?).
Case above with 7-day second febrile period (?).
Not known: 3 cases.

In our 11 cases the physical findings were extremely meager. At times the most to be found on examination was a slight injection of the throat and conjunctiva. At no time during the illness or convalescence was any form of exanthema observed. In most of the cases the site of previous attachment of a tick was still discernible. In none of the 11 cases was there evidence of any unusual reaction about this local area.

Certain laboratory procedures were followed routinely. The most outstanding finding of this work was the consistent reduction of the total white cell count without any decided shifts in cell distribution. The highest white cell count found in the series was 4,500, while the lowest (1,300) was found in two patients, No. 24, bled on the sixth day after onset, and No. 26, bled on the fifth day after onset. One patient, No. 13, was checked following convalescence and her count had returned to within normal limits.

Blood smears stained with either Giemsa or Wright's stain were examined on many occasions and nothing unusual was noted except a leucopenia and evidence of degeneration in some of the white cells. Weil-Felix tests using *Proteus* OX–19, OX–2, and OX–K were done on the sera from these patients with results that were interpreted as being not significant.

Clinically, the disease is characteristic, having a consistent history, no physical findings of importance, and a rather marked leucopenia.

EPIDEMIOLOGY

Certain of the epidemiological aspects of Colorado tick fever were studied during the season of 1940 as well as statistical data available from the Colorado State Board of Health. The city health officer of Boulder, Dr. H. L. Morency, has kept records of Colorado tick fever in Boulder since 1930. He very kindly has made these records available.

Seasonal distribution.—During 1938, 1939, and up to July 31, 1940, there were 175 cases reported to the Colorado State Division of Public Health for the entire State. Table 4 gives the distribution of these cases by months; it is noted that in 1938 and 1940 the peak occurred in June, while in 1939 it was 1 month earlier. This seasonal distribution coincides with the seasonal distribution of the wood tick, *D. andersoni*, in this area as well as with the cases of Rocky Mountain spotted fever, a disease known to be tick-transmitted. During 1938 and 1939 there were 27 cases of Rocky Mountain spotted fever reported to the Public Health Service by the State health officer of Colorado. They were distributed as follows: March, 1 case; April, 3; May, 10; June, 8, and July, 5.

TABLE 4.—*Reported cases of Colorado tick fever in the State of Colorado by months, 1938, 1939, and 1940* [1]

Months	1938		1939		1940	
	Number of cases	Percentage distribution by month	Number of cases	Percentage distribution by month	Number of cases	Percentage distribution by month
Total	53	100.0	58	100.0	64	100.0
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	1	1.9	1	1.7	0	0
April	1	1.9	3	5.2	7	10.9
May	9	17.0	28	48.3	17	26.6
June	31	58.5	18	31.0	35	54.7
July	9	17.0	8	13.8	5	7.8
August	2	3.8	0	0		
September	0	0	0	0		
October	0	0	0	0		
November	0	0	0	0		
December	0	0	0	0		
	0	0	0	0		

[1] Reported cases include all cases reported up to and including July 31, 1940.

The seasonal distribution of cases of Colorado tick fever in the city of Boulder varies somewhat from that in the State as a whole. There were 6 cases in March, 6 in April, 32 in May, 12 in June, and 2 in July for the period 1930–39 (fig. 2). It must be remembered that in Colorado there are areas with great differences in altitude, mean temperatures, and humidities. Boulder lies at the foot of the Rocky Mountains at an altitude of about 5,000 feet. The tick season is rather early and ends quickly, presumably because of the dry heat of June. The more mountainous areas are cooler, the ticks appear later and persist longer, and therefore cases of a tick-transmitted dis-

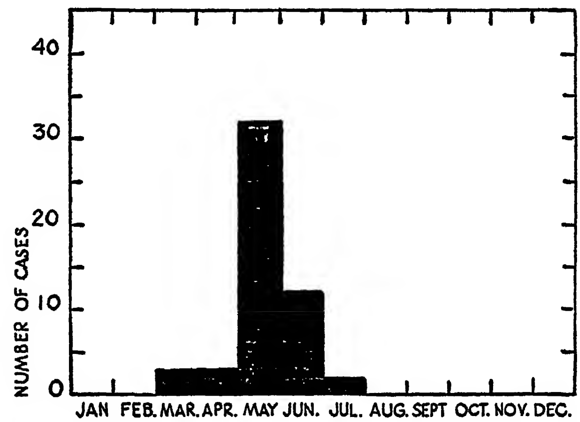

FIGURE 2.—Seasonal distribution of Colorado tick fever, city of Boulder, 1930–39.

ease would be expected several weeks later in these areas than at lower altitudes.

The recorded cases of Colorado tick fever in Boulder for the period 1930–39 are presented by years in figure 3. This is particularly interesting when certain facts are correlated with this graph. In 1938 the field laboratory was established in Laramie, Wyo., just 100 miles from Boulder, and one of the scientific personnel visited Boulder and spoke before the county medical society. In 1939 the field laboratory was located in Boulder. There were twice as many cases reported in 1938 as in any previous year and six times as many in 1939. These data would seem to indicate either that there are many cases not being recognized by the practitioners of medicine or that they are not being reported to the health authorities. With this point in mind, a trip was made over the western slope in Colorado. Many of the local doctors were interviewed. In one town a physician went over his records for 1939 and found that he had treated 23 cases of Colorado tick fever and that an associate had seen approximately a like number; yet none of these cases had been reported to the State Board of Health. From the foregoing, it must be assumed that the actual

number of cases of the disease far exceeds the reported cases and that data presented here can be considered only preliminary in nature until plans to collect more complete data are perfected and have been carried out.

Geographical distribution.—The name "Colorado tick fever" is misleading because the disease undoubtedly occurs in some of the surrounding States at least. It has been reported to the Public Health Service from Colorado, Utah, Idaho, and Wyoming. In May 1937, the latter State first reported 2 cases from Albany County and 2 cases

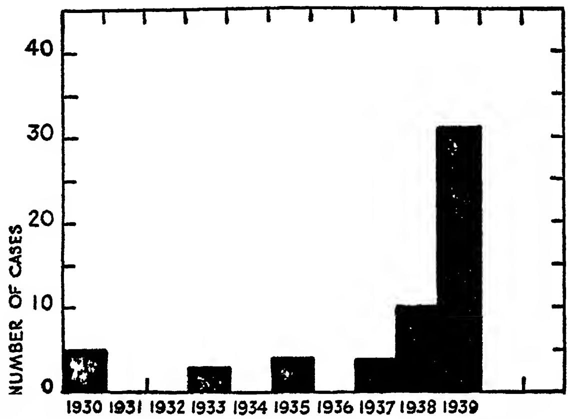

FIGURE 3.—Occurrence of Colorado tick fever in the city of Boulder, by years, 1930–39.

from Carbon County under the name "Colorado tick fever." However, cases were occurring in some of these States long before 1937. Becker's articles (*5*, *6*) appeared in 1930, reporting cases in Colorado along with a statement that his attention had first been directed to the syndrome by "several Boulder physicians" in 1922. In a published letter to Dr. Becker from Dr. Albert B. Tonkin, then president of the Wyoming State Board of Health, dated March 7, 1930, the statement is made, "I am positive that such a condition is not a separate entity of Colorado but is native also to Wyoming." [1]

Cases of the disease, at present, are reported in greater numbers in Colorado than in the surrounding States; for this reason their geographical distribution within the State of Colorado itself was studied. There are two foci, one with Boulder at the center and the other on the western slope of the Rocky Mountains with Delta as the center, in which the disease apparently occurs with greater frequency than elsewhere in the State. However, the disease has been reported from practically the entire mountainous region of the State, the areas where *D. andersoni* are prevalent. The flat prairie country of eastern Colorado has been free of the disease. In this area *D. andersoni* is absent

[1] Quoted by Becker Colorado Med., 27: 142 (1930).

or rare. In his monograph "The Genera Dermacentor and Otocentor (Ixodidae) in the United States," Cooley (7) states, "This tick (*D. andersoni*) is prevalent in Colorado, as shown by many laboratory collections, but is absent or rare east of the mountains, though we have one definite record from western Nebraska."

Figure 4 shows the geographic distribution of the cases reported in 1938, and figure 5 gives that for 1939.

Age and sex distribution.—Tables 5, 6, and 7 give the age and sex distribution for the 175 cases reported to the State health officer for 1938, 1939, and up to July 31, 1940. From an analysis of the tables it is readily apparent that the majority of the cases occur in the older age groups, as might be expected, since more persons of these ages are probably exposed to tick bites through occupation. Further, in analyzing distribution according to sex, it is apparent that males are affected more frequently than females. Again this is probably what might be expected since males, as a result of occupation, would be more exposed to tick bites than females. Rocky Mountain spotted fever, in this area, is also primarily a disease of the adult male population. The following figures for Idaho and Montana (1930–39, inclusive) [2] serve to illustrate this point:

Sex:	*0–14*	*15–39*	*40 and over*	*Total*
Male	55	239	312	606
Female	53	25	42	120

Thus it is seen that the age and sex distribution of the cases of Colorado tick fever is comparable to the age and sex distribution of spotted fever, a known tick-transmitted disease, in the Rocky Mountain region.

TABLE 5.—*Reported cases of Colorado tick fever in the State of Colorado, by age, 1938–40, inclusive* [1]

Age (years)	Number of cases	Percent at given ages	Age	Number of cases	Percent at given ages
Total	175	100.0	25-29	17	9.7
			30-34	16	9.1
Under 1	0	0	35-39	9	5.1
1	0	0	40-44	13	7.4
2	2	1.1	45-49	22	12.6
3	1	.6	50-54	18	10.3
4	2	1.1	55-59	4	2.3
5-9	13	7.4	60-64	12	6.9
10-14	8	4.6	65 and over	6	3.4
15-19	9	5.1	Age unknown	13	7.4
20-24	10	5.7			

[1] Includes all cases reported up to and including July 31, 1940.

Number of reported cases under 20 years of age, 35, or 20 percent. Number of reported cases 20 years of age and over, 140, or 80 percent.

[2] Reported to the authors by the State health officers of Idaho and Montana.

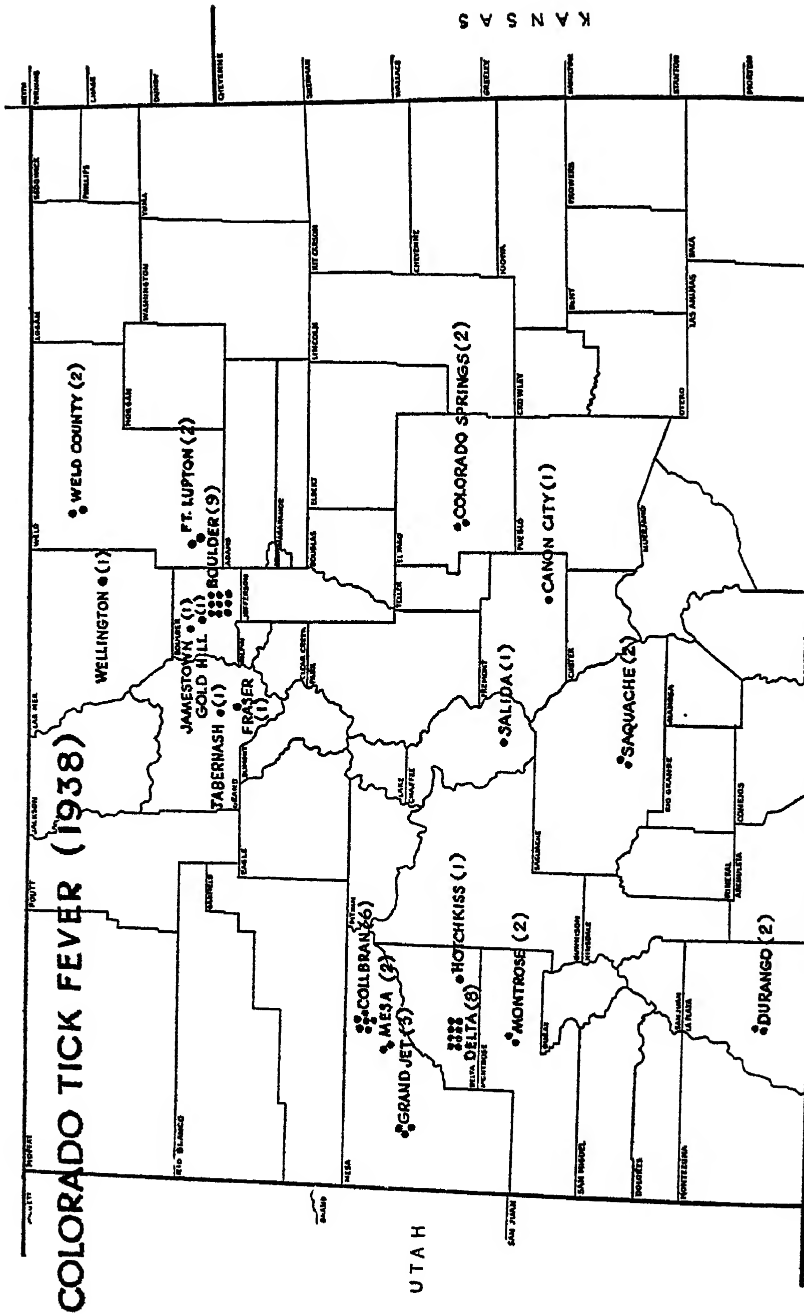

FIGURE 4.—Occurrence of Colorado tick fever in Colorado during 1938.

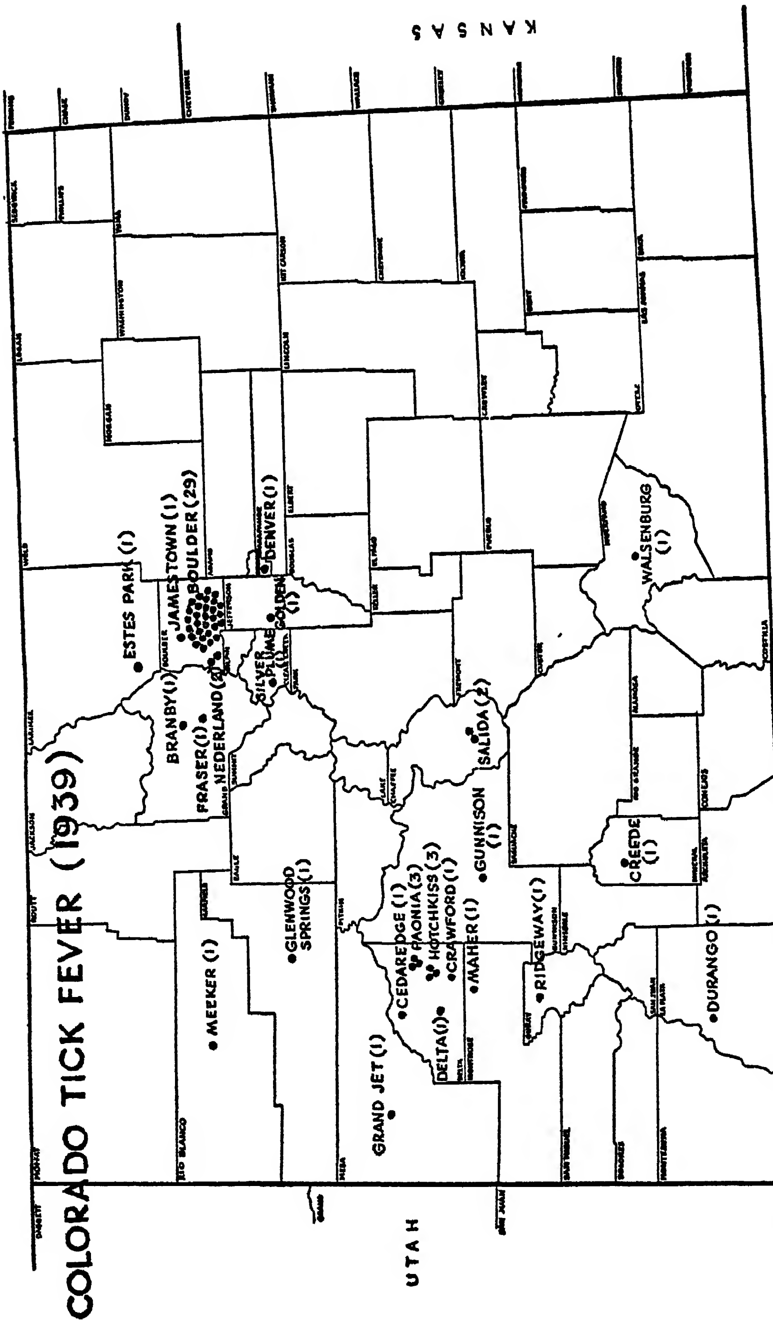

FIGURE 5.—Occurrence of Colorado tick fever in Colorado during 1939.

TABLE 6.—*Reported cases of Colorado tick fever in the State of Colorado, by age, 1938, 1939, and 1940* [1]

Age (years)	1938		1939		1940	
	Number of cases	Percent at given ages	Number of cases	Percent at given ages	Number of cases	Percent at given ages
Total	53	100.0	58	100.0	64	100.0
Under 1	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	1	1.7	1	1.6
3	1	1.9	0	0	0	0
4	0	0	2	3.5	0	0
5-9	2	3.8	5	8.6	6	9.4
10-14	2	3.8	3	5.2	3	4.7
15-19	2	3.8	2	3.5	5	7.8
20-24	1	1.9	2	3.5	7	10.9
25-29	5	9.4	4	6 9	8	12.5
30-34	7	13.2	2	3.5	7	10.9
35-39	2	3.8	2	3.5	5	7.8
40-44	6	11.3	3	5.2	4	6.3
45-49	8	15.0	9	15.5	5	7.8
50-54	7	13.2	9	15.5	2	3.1
55-59	1	1.9	1	1.7	2	3.1
60-64	1	1.9	6	10 3	5	7.8
65 and over	3	5.7	1	1.7	2	3.1
Age unknown	5	9.4	6	10.3	2	3.1

[1] Includes all cases reported up to and including July 31, 1940.

Mode of transmission.—From the field studies at Boulder certain methods of transmission can be ruled out at once. In the 11 cases seen during the month of May there were six different sources of milk; four of these sources were reliable dairies which dispensed only pasteurized milk. There were three separate sources of water. Two of the patients drank water only from deep private wells, 8 used water from the community supply, while 1 drank water supplied in a mine where he worked.

TABLE 7.—*Reported cases of Colorado tick fever in the State of Colorado, by sex, 1938, 1939, and 1940* [1]

Year	Total	Male	Percent males	Females	Percent females	Sex unknown
1938	53	41	77.4	12	22.6	0
1939	58	44	77.2	13	22.8	1
1940	64	49	76.5	15	23.5	0

[1] Includes all reported cases up to and including July 31, 1940.

Only 1 (No. 25) of the 11 cases occurred in a household in which there had been a previous case of Colorado tick fever this year. The onset of this case was on May 28, 1940, while onset of the previous case occurred on April 1, 1940, almost 2 months before. Of the 31 cases reported in Boulder during 1939, only 1 case occurred in a household in which there had been a previous case, and these 2 cases were separated by a 10-day interval. There was no traceable connection between any of the cases investigated during 1940, nor was there any concentration of cases in any particular section of the city.

Histories of these cases failed to reveal any consistent contact with the arthropod or insect group, other than ticks, or with animals. One patient, No. 27, stated that he had been bitten by a mosquito while on a fishing trip, and that he had also had two tick bites. The rest of the patients denied contact with mosquitoes.

All of the available evidence certainly points to the tick as the transmitting agent of Colorado tick fever. The seasonal, geographic, and age and sex distribution are all similar to Rocky Mountain spotted fever in that area, all 11 cases that were investigated had a recent tick bite, and, above all, the disease is called "tick fever" locally. It seemed that one possible fallacy might be that tick bites were so common in Boulder that any given disease might be successfully correlated with their occurrence. Therefore, a group of about 160 biology students in the high school were asked to bring to the laboratory any ticks found on their bodies or clothing during a 2-week period, May 15 to June 1; only 2 ticks were submitted by this group. It was thus believed that tick bites were a rather rare occurrence in this selected group in Boulder.

Attempts at isolation.—All attempts at isolation of the causative agent were unsuccessful. The usual procedures for the isolation of the rickettsiae were followed, inoculating various animals with whole, citrated, or defibrinated blood. The species of animals in which isolations were attempted were guinea pigs, monkeys, rats, mice, and rabbits. Some of the guinea pigs were on vitamin C deficient diets, and some of the rats and mice were on riboflavin deficient diets, yet in the main they reacted no differently than the normal animals. Several rabbits were inoculated intraocularly after the method proved successful in the isolation of tsutsugamushi (*8*). Cultivation of the causative agent in chicken embryo material also proved unsuccessful.

Citrated blood, macerated blood clot in saline, blood serum, and spinal fluid were all inoculated intracerebrally into mice at various times but the results were negative. Blood smears were studied for the occurrence of spirochetes or other blood parasites, but these have proved consistently negative.

The source material was collected from the patients on the first febrile rise and from some during the relapse, and finally from several during both rises in fever; yet none of the experimental animals showed any consistent variation from the normal.

Many local ticks were tested, but the results again were negative. Several ticks (*D. andersoni*), allegedly the cause of the syndrome in some of the patients, also were tested in various ways, but these, too, failed to infect the test animals.

DISCUSSION AND SUMMARY

Colorado tick fever is a clinical entity with a characteristic symptomatology and epidemiology. Its present geographical distribution is limited to the range of the tick, *D. andersoni*. Its seasonal distribution coincides with the seasonal distribution of this tick. The cases give a consistent history of tick bite usually 4 or 5 days previous to the onset of illness, and there is apparently no other source of infection revealed by this study.

Clinically the disease is a rather mild febrile illness with as yet no reported fatalities. The symptomatology consists of fever, headache, chills, backache, muscle pains, and photophobia. The febrile curve is usually broken by one remission of 2 or 3 days followed by a relapse of like duration. There is a consistent and rather marked leucopenia without any decided shifts in the differential count.

In reviewing the clinical picture of this disease one cannot help but be struck by its similarity clinically to dengue fever. The symptomatology, the interrupted febrile curve, the leucopenia are all part of the picture of this virus disease as well as of Colorado tick fever. However, the exanthema seen in over 50 percent of the cases of dengue fever (*9*) has not been noted in Colorado tick fever; furthermore, the epidemiology of the two is very dissimilar.

The actual causative agent in Colorado tick fever has not been successfully isolated. Until such time the true nature of the infection must remain obscure.

ACKNOWLEDGMENT

We wish to acknowledge gratefully the assistance and cooperation of Dr. H. L. Morency, city health officer of Boulder, Colo., during this study.

REFERENCES

(*1*) Pijper, A., and Dau, H.: South African typhus. J. Hyg., Cambridge, Eng., **35**: 116 (1935).

(*2*) Roberts, J. I.: The ticks of rodents and their nests, and the discovery that *Rhipicephalus sanguineus* Latr. is the vector of tropical typhus in Kenya. J. Hyg., Cambridge, Eng., **35**: 1 (1935).

(*3*) Patino, L., Afanador, A., and Paul, J. H.: A spotted fever in Tobia, Colombia. Am. J. Trop. Med., **17**: 639 (1937).

(*4*) Toomey, Noxon: Mountain fever and spotted fever of the Rocky Mountains—clinical studies. Ann. Int. Med., **5**: 585–600 (1931).

————: American mountain tick-fever and spotted fever of Rocky Mountains—comparative epidemography. Ann. Int. Med., **5**: 601–612 (1931).

————: American mountain tick-fever—semiography and nosology, with remarks on pathology and treatment. Ann. Int. Med., **5**: 912–923 (1932).

(*5*) Becker, Frederick E.: Tick-borne infections in Colorado. I. The diagnosis and management of infections transmitted by the wood tick. Colorado Med., **27**:36 (1930).

(*6*) Becker, Frederick E.: Tick-borne infections in Colorado. II. A survey of the occurrence of infections transmitted by the wood tick. Colorado Med., **27**: 87 (1930).

(7) Cooley, R. A.: The genera Dermacentor and Otocentor (Ixodidae) in the United States, with studies in variation. Pub. Health Bull. No. 171, p. 36, Government Printing Office, Washington, D. C., 1938.
(8) Nagayo, M., Tamiya, T., Mitamura, T., and Sato, K.: On the virus of tsutsugamushi disease and its demonstration by a new method. Jap. J. Exp. Med., 8: 309 (1930).
(9) Simmons, J. S., St. John, J. H., and Reynolds, F. H. K.: Experimental studies of dengue. Monograph No. 29, Bureau of Science, Manila, 1931.

COURT DECISION ON PUBLIC HEALTH

Compensation under workmen's compensation law allowed for death of employee from pneumonia.—(Ohio Court of Appeals; *Johnson* v. *Industrial Commission*, 27 N.E.2d 418; decided April 3, 1939.) In a proceeding under the Ohio workmen's compensation law to recover for the death of an employee from pneumonia it appeared that the deceased was subjected to a change in temperature in going, in the course of his employment, from the inside of a tank to the outside. The temperature inside the tank ranged from 110° to 120°, while outside of the tank the temperature varied from 69° to 88°. When the employee came from within the tank to the outside thereof his clothes were wet with perspiration. The appellate court concluded that the judgment of the lower court granting compensation should be affirmed. The cause of the pneumonia and death, said the court, was the internal injury resulting from the change of temperature that the employee was compelled to endure. "It was an unusual, sudden and unexpected happening, at a particular time, resulting in physical injuries accidental in origin and cause."

DEATHS DURING WEEK ENDED NOVEMBER 16, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 16, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,093	8,247
Average for 3 prior years	8,226	
Total deaths, first 46 weeks of year	381,988	378,489
Deaths under 1 year of age	503	510
Average for 3 prior years	497	
Deaths under 1 year of age, first 46 weeks of year	23,088	22,849
Data from industrial insurance companies:		
Policies in force	64,555,113	66,558,338
Number of death claims	10,110	12,002
Death claims per 1,000 policies in force, annual rate	8.2	9.5
Death claims per 1,000 policies, first 46 weeks of year, annual rate	9.6	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 23, 1940

Summary

The incidence of the nine communicable diseases reported weekly by the State health authorities continued favorable during the current week, with no significant increases or unusual prevalence recorded. The figures for diphtheria, meningococcus meningitis, scarlet fever, smallpox, and typhoid fever were not only below the 5-year (1935–39) median expectancy but were the lowest for the 5-year period.

The number of cases of influenza increased from 1,180 for the preceding week to 1,332 for the current week. The incidence declined in Virginia, South Carolina, and Texas, which reported the largest number of cases last week, and increased in California (from 138 cases to 471) and Arizona (from 56 to 117).

Of 26 cases of smallpox reported currently, 22 cases occurred in the North Central States, while no cases were reported in the New England, Middle Atlantic, South Atlantic, or Pacific States. The highest incidence of measles is apparently in the eastern area of the United States (New England, Middle Atlantic, and East North Central groups). Of 44 cases of endemic typhus fever, 16 were reported in Georgia, 8 in Alabama, and 7 in Mississippi. One case of leprosy was reported in Maryland.

For the current week the Bureau of the Census reports 8,070 deaths in 88 major cities of the United States, as compared with 8,093 for the preceding week and with a 3-year (1937–39) average of 7,913 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended November 23, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39	Week ended		Median, 1935-39
	Nov. 23, 1940	Nov. 25, 1939		Nov. 23 1940	Nov. 25, 1939		Nov. 23, 1940	Nov. 25, 1939		Nov. 23, 1940	Nov 25, 1939	
NEW ENG.												
Maine	1	8	8	------	1	1	64	47	37	1	0	0
New Hampshire	0	0	0	------	------	------	3	2	2	0	0	0
Vermont	0	0	1	------	------	------	12	39	30	0	0	0
Massachusetts	1	4	4	------	------	------	264	197	75	1	0	1
Rhode Island	1	1	0	------	------	------	0	54	32	0	0	0
Connecticut	0	0	2	4	1	4	4	60	55	2	0	0
MID. ATL.												
New York	13	17	29	[1] 1	[1] 7	[1] 13	493	129	129	0	5	5
New Jersey	10	16	11	8	12	8	183	11	23	2	1	0
Pennsylvania	16	42	42	------	------	------	972	23	62	2	1	2
E. NO. CEN.												
Ohio	10	17	46	25	9	9	35	15	18	0	0	1
Indiana	17	22	40	7	8	13	21	11	7	1	0	0
Illinois	19	39	42	8	20	12	356	18	18	0	0	1
Michigan [2]	12	12	18	------	------	1	348	183	37	2	1	2
Wisconsin	1	8	5	21	17	25	262	0	40	0	0	0
W. NO. CEN.												
Minnesota	1	6	7	------	8	1	59	70	41	0	0	1
Iowa	4	6	6	4	1	2	33	13	7	0	1	1
Missouri	4	16	28	8	------	25	5	28	17	2	1	2
North Dakota	5	0	1	9	1	8	0	1	5	0	0	0
South Dakota	0	6	2	------	------	------	0	2	2	0	0	0
Nebraska	0	1	4	------	------	------	2	2	3	0	0	0
Kansas	5	10	14	1	8	8	15	69	11	1	0	1
SO. ATL.												
Delaware	4	1	0	------	4	0	3	2	3	0	1	0
Maryland [3]	8	10	11	5	7	7	4	6	6	1	1	2
Dist. of Col.	1	0	7	1	------	------	3	4	2	0	1	0
Virginia [3]	24	57	68	123	129	------	48	8	23	2	1	4
West Virginia [3]	8	22	22	16	5	20	14	5	18	0	4	2
North Carolina [3]	27	94	78	5	8	6	8	189	132	1	0	1
South Carolina [3]	10	15	12	157	623	274	2	4	6	0	0	0
Georgia [3]	18	34	27	16	271	7	5	8	2	0	1	1
Florida [3]	9	9	9	2	7	4	2	3	3	0	0	0
E. SO. CEN.												
Kentucky	10	16	25	10	10	16	144	2	10	1	0	2
Tennessee [3]	16	23	23	14	57	40	13	18	8	1	2	3
Alabama [3]	12	34	37	52	181	48	11	10	10	0	3	2
Mississippi [2] [3]	4	20	21	------	------	------	------	------	------	0	3	1
W. SO. CEN.												
Arkansas	23	17	17	62	46	46	8	1	1	0	1	0
Louisiana [3]	8	13	23	6	9	6	0	1	1	1	1	1
Oklahoma	7	26	13	38	47	51	2	0	2	0	0	1
Texas [3]	17	55	54	104	833	209	2	87	9	1	1	1
MOUNTAIN												
Montana	8	2	2	5	45	6	4	16	16	0	0	0
Idaho	0	0	0	------	------	2	0	26	23	0	1	1
Wyoming	0	2	0	1	------	------	0	4	2	0	0	0
Colorado	6	4	7	11	9	------	26	21	5	1	1	1
New Mexico	0	4	5	4	1	1	14	2	3	0	1	0
Arizona	8	5	5	117	58	58	30	3	3	0	0	0
Utah [2]	0	0	1	12	22	------	2	45	15	0	1	0
Nevada	0	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	8	4	2	1	------	------	11	289	48	0	0	1
Oregon	2	0	1	18	28	23	23	21	9	0	1	0
California	17	25	40	471	16	33	68	149	149	1	0	4
Total	355	718	808	1,832	1,999	1,096	3,568	1,893	2,094	24	35	63
47 weeks	13,930	21,013	24,896	179,196	162,712	148,788	248,828	361,420	361,420	1,473	1,793	4,998

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 23, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Nov. 23, 1940	Nov. 25, 1939		Nov. 23, 1940	Nov. 25, 1939		Nov. 23, 1940	Nov. 25, 1939		Nov. 23, 1940	Nov. 25, 1939	
NEW ENG.												
Maine	0	0	0	9	22	19	0	0	0	0	1	1
New Hampshire	0	0	0	0	4	5	0	0	0	0	1	0
Vermont	0	1	0	11	3	6	0	0	0	0	1	1
Massachusetts	0	1	1	119	53	105	0	0	0	3	1	1
Rhode Island	0	0	0	3	3	9	0	0	0	0	0	0
Connecticut	1	1	1	29	43	43	0	0	0	5	2	2
MID. ATL.												
New York	3	14	7	141	233	259	0	0	0	6	7	8
New Jersey	1	3	1	72	106	77	0	0	0	5	3	2
Pennsylvania	4	7	7	187	218	349	0	0	0	9	14	15
E. NO. CEN.												
Ohio	16	2	2	130	213	252	0	0	0	2	2	4
Indiana	10	2	0	72	122	141	0	3	3	0	3	3
Illinois	26	8	3	242	314	314	4	0	1	3	6	6
Michigan [2]	13	2	2	112	229	274	9	3	1	2	3	3
Wisconsin	18	7	1	108	145	175	2	7	7	0	0	2
W. NO. CEN.												
Minnesota	11	9	2	70	143	143	6	21	8	0	0	0
Iowa	6	5	2	99	92	92	0	2	2	1	0	3
Missouri	5	0	2	49	81	86	0	0	4	2	6	6
North Dakota	1	1	0	11	29	29	0	0	16	0	0	0
South Dakota	0	0	0	24	38	36	0	2	2	0	0	0
Nebraska	6	6	0	7	21	21	1	0	0	0	2	0
Kansas	2	1	1	89	112	125	0	0	1	3	3	3
SO. ATL.												
Delaware	0	0	0	7	26	9	0	0	0	0	3	0
Maryland [2]	1	0	0	36	84	50	0	0	0	2	3	7
Dist. of Col.	0	0	0	8	11	11	0	0	0	0	0	0
Virginia [3]	9	2	0	55	79	51	0	0	0	6	9	9
West Virginia [2]	18	3	0	44	114	104	0	0	0	1	4	5
North Carolina [3]	2	0	1	78	124	76	0	0	0	8	0	4
South Carolina [3]	0	1	1	10	16	11	0	0	0	0	0	2
Georgia [3]	0	0	0	35	37	27	0	0	0	5	9	9
Florida [3]	0	0	0	3	7	7	0	0	0	4	0	0
E. SO. CEN.												
Kentucky	4	2	2	79	96	75	0	0	0	4	4	7
Tennessee [3]	3	0	2	98	98	70	1	0	0	3	3	4
Alabama [3]	1	2	2	35	45	28	0	0	0	2	3	3
Mississippi [2] [3]	0	1	1	18	13	17	0	0	0	2	1	3
W. SO. CEN.												
Arkansas	0	2	2	18	23	13	1	0	2	10	7	4
Louisiana [3]	0	0	0	8	12	15	0	0	0	5	9	9
Oklahoma	1	1	1	12	27	27	0	5	4	5	2	9
Texas [3]	1	3	1	16	68	68	0	10	2	0	18	20
MOUNTAIN												
Montana	1	0	0	24	37	37	1	0	23	0	0	0
Idaho	1	4	0	11	6	24	0	0	1	4	1	2
Wyoming	2	0	0	5	4	9	0	0	0	0	1	0
Colorado	2	1	1	31	26	39	0	1	3	2	1	1
New Mexico	0	1	1	6	7	25	0	0	0	5	1	4
Arizona	0	0	0	8	8	10	0	0	0	1	1	1
Utah [2]	1	3	0	12	11	18	1	1	0	3	1	0
Nevada	0	----	----	0	----	----	0	----	----	0	----	----
PACIFIC												
Washington	1	2	0	13	16	45	0	8	3	3	2	2
Oregon	8	1	0	25	25	34	0	0	3	2	2	2
California	5	24	11	78	169	212	0	2	3	9	15	7
Total	179	118	114	2,357	3,363	3,979	26	60	127	127	155	200
47 weeks	9,379	6,911	6,911	140,753	143,500	199,748	2,202	9,122	9,122	9,038	12,077	13,609

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 23, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Whooping cough, Week ended Nov. 23, 1940	Whooping cough, Week ended Nov. 25, 1939	Division and State	Whooping cough, Week ended Nov. 23, 1940	Whooping cough, Week ended Nov. 25, 1939
NEW ENG.			SO. ATL.—continued		
Maine	29	49	Georgia [3]	18	8
New Hampshire	10	6	Florida [3]	6	5
Vermont	10	78	E. SO. CEN.		
Massachusetts	266	114	Kentucky	67	41
Rhode Island	5	16	Tennessee [3]	51	22
Connecticut	115	77	Alabama [3]	13	32
MID. ATL.			Mississippi [2 3]		
New York	465	334	W. SO. CEN.		
New Jersey	147	116	Arkansas	7	3
Pennsylvania	649	279	Louisiana [3]	4	43
E. NO. CEN.			Oklahoma	15	7
Ohio	289	98	Texas [3]	37	83
Indiana	26	56	MOUNTAIN		
Illinois	130	125	Montana	5	3
Michigan [2]	322	109	Idaho	6	2
Wisconsin	134	154	Wyoming	1	8
W. NO. CEN.			Colorado	17	11
Minnesota	119	72	New Mexico	20	3
Iowa	20	6	Arizona	2	15
Missouri	99	20	Utah [2]	24	87
North Dakota	9	6	Nevada	0	
South Dakota	4	2	PACIFIC		
Nebraska	8	4	Washington	41	12
Kansas	116	12	Oregon	10	27
SO. ATL.			California	323	105
Delaware	38	15	Total	4 099	2,381
Maryland [2]	89	52	47 weeks	150,970	159,786
Dist. of Col.	9	10			
Virginia [3]	86	20			
West Virginia [2]	29	13			
North Carolina [3]	176	63			
South Carolina [3]	33	8			

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Nov. 23, 1940, 44 cases as follows: Virginia, 1; North Carolina, 4; South Carolina, 1, Georgia, 16; Florida, 1; Tennessee, 1; Alabama, 8; Mississippi, 7; Louisiana, 4; Texas, 1

WEEKLY REPORTS FROM CITIES

City reports for week ended November 9, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	198	96	32	472	470	881	5	322	37	960	--------
Current week	84	53	17	889	292	658	0	288	16	1,345	--------
Maine:											
Portland	0	------	0	0	1	0	0	0	0	7	22
New Hampshire:											
Concord	0	------	0	0	1	0	0	0	0	0	11
Manchester	------	------	------	------	------	------	------	------	------	------	------
Nashua	0	------	0	0	0	0	0	0	0	0	9
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	2
Burlington	0	------	0	2	0	1	0	0	0	0	11
Rutland	0	------	0	0	0	0	0	0	0	0	3
Massachusetts:											
Boston	0	------	0	42	13	25	0	5	0	74	209
Fall River	2	------	0	0	0	4	0	1	0	0	27
Springfield	0	------	0	1	1	8	0	2	0	1	40
Worcester	0	------	0	86	3	1	0	1	0	0	58
Rhode Island:											
Pawtucket	0	------	0	0	0	3	0	0	0	0	24
Providence	0	------	1	0	2	3	0	1	0	3	49
Connecticut:											
Bridgeport	0	------	0	0	1	2	0	0	0	3	36
Hartford	0	------	0	0	0	4	0	0	0	2	50
New Haven	0	1	0	0	1	0	0	0	0	27	31
New York:											
Buffalo	0	------	0	7	11	8	0	6	0	22	132
New York	13	6	3	176	52	64	0	67	4	134	1,421
Rochester	0	------	0	1	2	3	0	0	0	12	56
Syracuse	0	------	0	0	0	1	0	0	0	3	53
New Jersey:											
Camden	1	------	0	25	2	1	0	1	0	3	30
Newark	0	2	0	13	5	23	0	6	0	32	86
Trenton	0	------	0	0	0	6	0	2	0	3	39
Pennsylvania:											
Philadelphia	2	------	0	173	11	41	0	19	3	139	429
Pittsburgh	2	------	1	1	7	4	0	7	0	32	159
Reading	0	------	0	3	1	0	0	0	0	37	34
Scranton	0	------	--------	2	-------	0	0	-------	0	1	--------
Ohio:											
Cincinnati	1	------	0	0	4	15	0	5	0	18	135
Cleveland	1	15	1	1	11	22	0	10	0	76	185
Columbus	0	------	0	0	2	8	0	1	0	9	56
Toledo	1	------	0	1	1	5	0	3	0	7	77
Indiana:											
Anderson	0	------	0	0	0	4	0	0	0	0	8
Fort Wayne	0	------	0	0	0	2	0	0	0	0	20
Indianapolis	0	------	1	1	3	14	0	0	1	5	78
Muncie	0	------	0	0	3	4	0	0	0	0	13
South Bend	0	------	0	0	2	0	0	0	0	0	10
Terre Haute	0	------	0	0	0	1	0	0	0	0	17
Illinois:											
Alton	0	------	0	0	0	3	0	0	0	1	6
Chicago	13	------	0	162	18	125	0	28	2	96	615
Elgin	0	------	0	0	1	0	0	0	0	1	14
Springfield	0	------	0	0	1	1	0	0	0	0	15
Michigan:											
Detroit	7	2	0	131	12	46	0	10	1	163	230
Flint	0	------	0	1	6	1	0	0	0	8	28
Grand Rapids	1	------	1	0	0	7	0	0	0	22	34
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	0	7
Madison	0	------	0	1	0	1	0	0	0	3	17
Milwaukee	0	1	1	17	4	19	0	8	0	30	114
Racine	0	------	0	1	0	8	0	1	0	0	11
Superior	0	------	0	0	0	0	0	0	0	0	11

City reports for week ended November 9, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	0	0	3	0	1	0	9	16
Minneapolis	0	------	0	1	1	17	0	2	0	24	95
St. Paul	0	------	0	4	3	15	0	4	0	25	55
Iowa:											
Cedar Rapids	0	------	------	0	------	10	0	------	0	0	------
Davenport	0	------	------	0	------	6	0	------	0	0	------
Des Moines	0	------	0	0	0	7	0	0	0	1	33
Sioux City	0	------	------	0	------	2	0	------	0	0	------
Waterloo	5	------	------	0	------	2	0	------	0	0	------
Missouri:											
Kansas City	0	------	0	0	11	9	0	2	1	25	89
St. Joseph	1	------	0	0	3	0	0	0	0	0	22
St. Louis	10	------	0	0	7	13	0	2	1	19	183
North Dakota:											
Fargo	0	------	0	0	0	2	0	0	0	3	5
Grand Forks	0	------	------	0	------	2	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	9
South Dakota:											
Aberdeen	0	------	------	0	------	2	0	------	0	4	------
Sioux Falls	0	------	0	0	0	5	0	0	0	0	10
Nebraska:											
Lincoln	0	------	------	0	------	3	0	------	0	4	------
Omaha	0	------	0	0	3	1	0	1	0	1	36
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	3
Topeka	0	------	0	0	2	9	0	0	0	0	36
Wichita	0	------	0	1	1	3	0	0	0	10	25
Delaware:											
Wilmington	0	------	0	0	0	0	0	0	0	4	25
Maryland:											
Baltimore	0	3	2	1	5	11	0	12	0	86	193
Cumberland	0	------	0	0	0	0	0	1	0	0	15
Frederick	0	------	0	0	0	0	0	0	0	0	5
Dist. of Col.:											
Washington	4	------	0	0	7	6	0	7	0	14	174
Virginia:											
Lynchburg	3	------	0	0	0	1	0	0	0	0	8
Norfolk	1	------	0	0	1	6	0	1	2	0	22
Richmond	2	------	0	0	3	9	0	2	0	0	46
Roanoke	0	------	0	4	0	1	0	0	0	5	14
West Virginia:											
Charleston	0	------	0	0	0	1	0	0	0	0	8
Huntington	0	------	------	0	------	1	0	------	0	0	------
Wheeling	0	------	0	0	2	0	0	0	0	2	20
North Carolina:											
Gastonia	2	------	------	0	------	0	0	------	0	5	------
Raleigh	0	------	0	0	0	1	0	0	0	3	5
Wilmington	3	------	0	0	0	3	0	0	0	0	11
Winston-Salem	1	------	0	2	0	2	0	1	0	16	12
South Carolina:											
Charleston	0	8	0	9	3	1	0	1	0	1	17
Florence	0	4	0	0	0	0	0	0	0	0	9
Greenville	0	------	0	0	0	2	0	0	0	1	12
Georgia:											
Atlanta	1	------	0	0	5	8	0	3	0	1	79
Brunswick	0	------	0	0	0	0	0	0	0	4	4
Savannah	0	1	1	0	1	0	0	2	0	1	46
Florida:											
Miami	0	1	0	1	0	0	0	2	1	0	33
Tampa	2	------	0	0	3	0	0	0	0	0	20
Kentucky:											
Ashland	0	------	0	0	1	0	0	1	0	0	8
Covington	0	------	0	0	0	0	0	0	0	0	13
Lexington	0	------	0	30	0	1	0	1	0	18	12
Louisville	------	------	------	------	------	------	------	------	------	------	------
Tennessee:											
Knoxville	0	1	0	0	2	8	0	0	0	7	26
Memphis	0	------	0	4	2	7	0	5	2	16	53
Nashville	0	------	1	1	0	6	0	2	0	0	63
Alabama:											
Birmingham	1	2	0	7	4	3	0	5	0	4	50
Mobile	1	1	0	0	1	2	0	0	0	0	17
Montgomery	0	1	------	0	------	2	0	------	0	1	------
Arkansas:											
Fort Smith	0	------	------	0	------	1	0	------	0	0	------
Little Rock	0	1	0	0	4	0	0	2	0	1	------

City reports for week ended November 9, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cascs	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	0		0	0	0	0	0	0	0	0	3
New Orleans	8	2	0	1	6	5	0	9	1	4	160
Shreveport	0		0	1	2	0	0	3	0	0	57
Oklahoma:											
Oklahoma City	0		0	0	7	4	0	0	0	0	38
Tulsa	2		0	0	8	0	0	1	1	6	19
Texas:											
Dallas	1		0	0	0	4	0	0	0	0	54
Fort Worth	0		0	9	4	0	0	1	1	8	36
Galveston	0		0	0	1	1	0	0	0	0	10
Houston	1		0	0	0	2	0	3	0	0	74
San Antonio	0	1	1	1	2	0	0	7	0	6	54
Montana:											
Billings	0		0	0	3	2	0	0	0	0	13
Great Falls	0		0	1	0	0	0	0	0	0	5
Helena	0		0	0	0	0	0	0	0	0	2
Missoula	0	1	0	0	0	3	0	0	0	0	5
Idaho:											
Boise	0		0	0	0	0	0	0	0	0	5
Colorado:											
Denver	2		0	1	9	9	0	3	0	5	87
Pueblo	0		0	0	0	1	0	0	0	0	6
New Mexico:											
Albuquerque	0		0	0	0	0	0	3	0	0	15
Utah:											
Salt Lake City	0		0	1	2	1	0	0	0	13	37
Washington:											
Seattle	3		1	0	7	5	0	3	0	9	119
Spokane	0		0	0	0	3	0	1	0	0	28
Tacoma	0		0	1	1	1	0	0	0	0	32
Oregon:											
Portland	2	2	0	3	2	3	0	3	0	0	68
Salem	0			0		0	0		0	0	
California:											
Los Angeles	2	6	2	6	4	21	0	15	0	42	328
Sacramento	0		0	0	2	0	0	2	0	2	23
San Francisco	0		0	0	5	3	0	6	0	29	200

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Worcester	0	0	1
New York:			
New York	1	0	2
New Jersey:			
Newark	2	0	2
Pennsylvania:			
Philadelphia	0	0	1
Ohio:			
Cleveland	0	0	2
Columbus	0	0	2
Toledo	0	0	2
Indiana:			
Indianapolis	0	0	2
Illinois:			
Chicago	0	0	13
Michigan:			
Detroit	1	0	2
Flint	0	0	1
Grand Rapids	0	0	1
Minnesota:			
Minneapolis	1	0	1

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Iowa:			
Sioux City	0	0	1
Missouri:			
Kansas City	0	0	6
Virginia:			
Roanoke	0	0	2
Alabama:			
Birmingham	2	0	0
Louisiana:			
New Orleans	0	0	3
Shreveport	0	1	2
Utah:			
Salt Lake City	0	0	1
Washington:			
Seattle	0	0	1
Spokane	0	0	1
Tacoma	0	0	3
California:			
Los Angeles	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Rochester, 1; Newark, 1.
Pellagra.—Cases: Charleston, S. C., 2; Savannah, 11; Montgomery, 2.
Typhus fever.—Cases: Charleston, S. C., 1; Atlanta, 3; Savannah, 3; Miami, 1; Montgomery, 1; Houston, 3; Los Angeles, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended October 26, 1940.—During the week ended October 26, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1		4	3	1		2		11
Chickenpox		9	1	89	213	100	21	77	85	595
Diphtheria		32	8	25		14				79
Dysentery				4	5					9
Influenza		4			6	1			22	33
Measles		14		44	111	77	29	42	34	351
Mumps				10	65	24	1	6	4	110
Pneumonia		5			8				7	20
Poliomyelitis				5	3	1				9
Scarlet fever		11	7	111	107	6	19	5	14	280
Smallpox							1			1
Trachoma							6		4	10
Tuberculosis	2	3	4	55	31		2	1		98
Typhoid and paratyphoid fever		1	3	25	5	1			5	40
Whooping cough		13	1	217	115	64	6	11	23	450

CUBA

Habana—Communicable diseases—4 weeks ended October 19, 1940.—During the 4 weeks ended October 19, 1940, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths
Diphtheria	10	1
Malaria	3	
Tuberculosis	1	1
Typhoid fever	23	5

Provinces—Notifiable diseases—4 weeks ended October 12, 1940.—During the 4 weeks ended October 12, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		2		4	2	9	17
Chickenpox				1			1
Diphtheria	1	9	2	3	1	1	17
Hookworm disease		20					20
Leprosy					1	1	2
Malaria	43	2		6	1	41	93
Measles	1	4	2				7
Poliomyelitis				1			1
Scarlet fever		2					2
Tuberculosis	32	53	28	26	17	27	183
Typhoid fever	7	46	5	21	16	28	123
Yaws						1	1

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates

Place		January-August 1940	September 1940	October 1940—week ended— 5	12	19	26
ASIA							
Ceylon [1]							
China:							
Dairen	C	2					
Foochow	C	29	97				
Hong Kong	C	5	753	24	12	6	9
Macao	C	20	345	67	37	25	14
Manchuria	C	31					
Shanghai	C	341	124	37	33	20	8
Shantung Province	C	244					
India	C	39,561					
Bassein	C	164					
Bombay	C	12	1				
Calcutta	C	1,805	87	18	11	52	35
Cawnpore	C	291	38		4		
Chittagong	C	4					
Madras	C	1					
Moulmein	C	16					
Porto Novo	C	1					
Rangoon	C	43					
Vizagapatam	C	20		1			
India (French)	C	34					
Indochina (French)	C	436					
Thailand	C	235					

[1] For the week ended Nov. 9, 1940, 1 case of cholera was reported in Trincomalee, Ceylon.

PLAGUE

[C indicates cases; D, deaths]

Place		January-August 1940	September 1940	October 1940—week ended— 5	12	19	26
AFRICA							
Algeria	C	6	14			2	
Plague-infected rats		2					
Belgian Congo	C	21				2	
British East Africa:							
Kenya	C	8					
Uganda	C	146					
Egypt	C	[1] 409					
Madagascar	C	472					[2] 17
Morocco [3]							
Rhodesia, Northern	C	1					
Senegal:							
Dakar	D	[4] 1					
Thies	C	1					
Tivaouane	C	3					
Tunisia: Tunis	C		5			1	
Plague-infected rats			1				
Union of South Africa	C	25					
ASIA							
China [5]							
Dutch East Indies:							
Java and Madura	C	284					
West Java	C	8					
India	C	14,438					
Bassein	C	18					
Cochin	C	1					
Plague-infected rats		3		1			1
Rangoon	C	6					
Indochina (French)	C	3					

[1] Includes 5 cases of pneumonic plague. [2] For the period Oct. 20-30, 1940.

[3] A report dated May 11, 1940, stated that there was an epidemic of bubonic plague in southern Morocco, where several hundred cases had been unofficially reported.

[4] Imported.

[5] Information dated July 7 states that up to July 5, 17 cases of plague had been reported near Tungliao, Hsingan Province, China; and a report dated July 13 states that an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh. Information dated Aug. 17 states that 45 cases of plague with 36 deaths had occurred in Nungen District and a telegram dated Oct. 2 states that 15 cases of bubonic plague with 3 deaths occurred in Hsinking, Manchuria.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

Place		January–August 1940	September 1940	October 1940—week ended— 5	12	19	26
ASIA—continued							
Thailand:							
Bangkok	C	3					
Bisnulok Province	C	3					
Chingmai	C	3					
Dhonpuri Province	C	1					
Jayanad Province	C	3					
Kamphaeng Bajr Province	C	29					
Kanchanapuri Province	C	12					
Koan Kaen Province	C	5					
Nagara Svarga Province	C	30					
Noangkhay Province	C	4					
Sukhodaya Province	C	22					
EUROPE							
Portugal: Azores Islands	C	2					
SOUTH AMERICA							
Argentina:							
Catamarca Province	C	8					
Cordoba Province	C	[6] 30	1				[7] 9
Jujuy Province	C	9					
Salta Province	C	8					
San Luis Province	C	1					
Santiago del Estero Province	C	70	6				[7] 3
Tucuman Province	C	19	1				[7] 1
Brazil							
Alagoas State	C	9					
Pernambuco State	C	4					
Ecuador: El Oro Province	C	6					
Peru:							
Cajabamba Department	C	1					
Cajamarca Department	C	27					
Lambayeque Department	C	12					
Libertad Department	C	47					
Lima Department	C	44	3				
Piura Department	C	6					
Tumbes Department	C	[8] 18	1				
OCEANIA							
Hawaii Territory: Plague-infected rats		36	3		2	1	

[6] Includes 11 cases of pneumonic plague.
[7] For the month of October 1940.
[8] Includes 3 suspected cases.

SMALLPOX

[C indicates cases; D, deaths]

Place		January–August 1940	September 1940	October 1940—week ended— 5	12	19	26
AFRICA							
Algeria	C	5					
Angola	C	103					
Belgian Congo	C	3,010					
British East Africa	C	43					
Dahomey	C	50	2			19	
French Guinea	C	13					
Gibraltar	C	[1] 1					
Ivory Coast	C	113					
Nigeria	C	2,014					
Niger Territory	C	594	5				
Nyasaland	C	60	11				
Portuguese East Africa	C	1					
Rhodesia:							
Northern	C	6					
Southern	C	196	7				
Senegal	C	134					
Sierra Leone	C	10					
Sudan (Anglo-Egyptian)	C	501	17	1			6
Sudan (French)	C	1					
Union of South Africa	C	106					

[1] Imported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

Place		January-August 1940	September 1940	October 1940—week ended—			
				5	12	19	26
ASIA							
Arabia	C	255					
China	C	819					
Chosen	C	533					
Dutch East Indies—Sabang	C	4					
India	C	154,740					
India (French)	C	5					
India (Portuguese)	C	20					
Indochina (French)	C	1,160					
Iran	C	177					
Iraq	C	218	261	48	40	19	31
Japan	C	500					
Straits Settlements	C	1					
Sumatra	C	1					
Thailand	C	168	14	3	3		1
EUROPE							
Great Britain	C	2					
Greece	C	23					
Portugal	C	354	2	1	2		
Spain	C	605					
Turkey	C	139					
NORTH AMERICA							
Canada	C		7	1			
Guatemala	C	35					
Mexico	C	53					
SOUTH AMERICA							
Bolivia	C	288					
Brazil	C	1					
Colombia	C	1,349	2				
Ecuador	C	1					
Peru	C	104					
Venezuela (alastrim)	C	163	20				

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January-August 1940	September 1940	Oct. 5	Oct. 12	Oct. 19	Oct. 26
AFRICA							
Algeria	C	1,784			16	1	
Belgian Congo	C	1,210					
British East Africa	C	2					
Egypt	C	3,574	21	8	8	2	2
Eritrea	C	40					
Morocco	C	277					
Tunisia	C	515					
Union of South Africa	C	154					
ASIA							
China	C	2,065	17				
Chosen	C	359					
India	C	3					
Indochina (French)	C	2					
Iran	C	233					
Iraq	C	123	5	1	1	26	
Japan	C	2					
Palestine	C	109	16	23	8	5	13
Straits Settlements	C	7					
Sumatra	C	[1]1					
Trans-Jordan	C	15					
EUROPE							
Bulgaria	C	139			2	3	1
Germany	C	213					
Greece	C	29	5		1	2	
Hungary	C	76	1			1	
Irish Free State	C	10					
Lithuania	C	115					
Rumania	C	1,243	5	1		4	3
Spain	C	14					
Turkey	C	503					
Yugoslavia	C	282					

[1] For the month of July 1940.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

Place		January-August 1940	September 1940	October 1940—week ended—			
				5	12	19	26
NORTH AMERICA							
Guatemala	C	269	8				
Mexico	C	175	8				
Panama Canal Zone	C	3					
SOUTH AMERICA							
Bolivia	C	626					
Chile	C	241					
Ecuador	C	2					
Peru	C	667					
Venezuela	C	11					
OCEANIA							
Australia	C	10					
Hawaii Territory	C	19	2	1			

YELLOW FEVER

[C indicates cases: D, deaths]

Place		January-August 1940	September 1940	October 1940—week ended 5	12	19	26
AFRICA							
Cameroon: Nkongsamba	C	[1]1					
French Equatorial Africa: Fort Archambault	C	[1]1					
Gold Coast	C	1					
Ivory Coast	C	[2]4					[1]1
Nigeria:							
Ibadan	C	1					
Oshogbo	C	[1]1					
Sudan (Anglo-Egyptian): Kordofan Province.[3]							
Sudan (French): Segou.[4]							
Togo (French)	C	1					
SOUTH AMERICA							
Brazil:							
Espirito Santo State	D	[5]28					
Rio de Janeiro State	D	[5]1					
Colombia:							
Antioquia Department—San Luis	D	2					
Caldas Department—							
La Pradera	D	1					
Samana	D	1					
Victoria	D	1					
Meta Department	D	2		1			
Municipality of Jesus Maria	D		1				
Santander Department	D	1		1			

[1] Suspected.
[2] Includes 2 suspected cases.
[3] For the week ended Nov. 9, 1940, 733 cases of yellow fever with 75 deaths were reported in Kordofan Province, Anglo-Egyptian Sudan.
[4] For the week ended Nov. 9, 1940, 1 suspected case of yellow fever was reported in Segou, French Sudan.
[5] Jungle type.

X

Public Health Reports

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IN THIS ISSUE

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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CONTENTS

Public Health Reports

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STUDIES ON FOODSTUFFS FUMIGATED WITH METHYL BROMIDE [1]

By H. C. DUDLEY, *Associate Chemist*, J. W. MILLER, *Pathologist*, P. A. NEAL, *Passed Assistant Surgeon*, and R. R. SAYERS, *Senior Surgeon*, *United States Public Health Service*

The use of methyl bromide as a fumigant for the control of insect pests has increased markedly within the past 3 years. Control of the spread of the Japanese beetle has occasioned initiation of the use of methyl bromide in fumigation of railroad cars containing fresh vegetables going out of the Japanese beetle quarantine area. During the fumigation seasons of 1938 and 1939, several thousand carloads of fresh vegetables were treated by methods developed and approved by the United States Department of Agriculture (*1*). This type of fumigation applied to dried fruits has increased to such an extent that large quantities of such produce originating in the western fruit-growing States have been so treated.

The effectiveness of methyl bromide at moderate concentrations in causing death of many insects in nearly all stages of development, and the ease of handling and operation, makes the increased use of this fumigant probable (*2*). The annual production of methyl bromide in the United States during the past 5 years has increased more than sevenfold, owing primarily to the rapid increase in fumigation procedures developed and placed in commercial use during this time.

Two public health problems are encountered in the use of this fumigant: First, the dangers arising from the exposure of fumigators and others to the fumigant; and second, the effect on the consumer of the residue on fumigated foods. In order to study certain phases of these problems the United States Public Health Service has been carrying on studies with methyl bromide for the past 2 years, in cooperation with Dr. Lon A. Hawkins, Chief of the Division of Control Investigations, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

This study deals primarily with possible injury to consumers of foodstuffs fumigated with methyl bromide; as an addendum to this

[1] From the Division of Industrial Hygiene, National Institute of Health.

paper, there is given a discussion of the precautions which should be considered when using methyl bromide as a fumigant, together with recommendations which have been found effective for its safe use.

The problem of the consumer hazard of methyl bromide has been approached from two angles: First, investigation of foodstuffs, with determination of the rate of release of methyl bromide and the amount of residual bromide following fumigation; and second, the physiological and pathological changes induced by consumption of methyl bromide-treated foodstuffs as shown in experimental animals.

Methyl bromide is a colorless organic liquid, having the formula CH_3Br, with a boiling point of 4.6° C., so that at ordinary room temperature it is a gas. The specific gravity of the gas is 3.27 (air=1). The inflammable limits are within a very narrow range, 13.5–14.5 percent by volume. In the fumigation procedures described later in this paper, and in commercial practice, the concentration of methyl bromide is 1 percent, or less, by volume so that the fire or explosion hazards are negligible. The use of methyl bromide as a fire extinguisher fluid, especially in portable or automobile fire ex inguishers, is rather widespread in Europe. Recently methyl bromide fire extinguishers have been placed on the market in the United States.

The methyl bromide now supplied in commercial quantities is of high purity, being more than 99 percent methyl bromide. Methyl bromide has a slight aromatic odor in high concentrations. At low concentrations, which may still be toxic, the gas has no odor.

ANALYSIS OF FOODSTUFFS FOR BROMIDE RESIDUES

In order to study the absorption and adsorption of methyl bromide by foodstuffs, a method of analysis for total bromide in food products has been developed. Results of analyses by this method are shown in tables 1 and 2. This analytical procedure involves the hydrolysis of the CH_3Br by means of alcoholic potassium hydroxide, drying, and ashing at 500° C. The carbonized material was extracted with water, and the residue again ashed at 500° C. The ash was extracted again, at which time the combined water extracts were taken to dryness. The dried extracts were taken up with H_2SO_4, treated with chromic acid solution, and the resultant bromide aerated into KI solution. The liberated iodine was titrated with standard thiosulfate. The details of this method of analysis, together with the results of standard samples, have been given by Dudley in an earlier publication (*3*).

Results.—Table 1 shows the bromide content of various foodstuffs before fumigation, immediately after fumigation, and 24 and 48

hours later. All data are for materials fumigated under laboratory conditions. Examination of table 1 indicates that, in general, fresh vegetables and fruits, dried fruits, and whole grains retain but minor amounts of the fumigant. Milled grains and fatty or oily foods (i. e., nuts, nutmeats, cheese) absorb a greater amount of the methyl bromide and generally retain considerable quantities of bromides even after aeration for 48 hours.

TABLE 1.—*Bromide content of fruits and vegetables after laboratory fumigation with CH_3Br* [1]

Sample	Mg. Br/100 gm. sample				Dosage CH_3Br at atmospheric pressure 20–25° C.
	Before fumigation (control)	Immediately after fumigation	24 hours after fumigation	48 hours after fumigation	
White potatoes:					
Peel	2.58	4.22	3.66	3.02	2 pounds CH_3Br/1,000 cubic feet for 2 hours.
Pulp	0.79	1.28	1.29	1.00	
Sweet potatoes:					
Peel	1.66	3.16	3.20	3.16	Do.
Pulp	.55	.99	.98	.90	
Green beans	.54	7.22	4.20	4.08	Do.
Tomatoes	Trace	1.26	1.11	.91	Do.
Eggplant	.10	2.39	2.11	1.72	Do.
Onions	Trace	.80	.62	.61	Do.
Carrots	do	2.59	1.23	1.20	Do.
Beets	.83	3.65	3.33	3.16	Do.
Turnips	None	2.43	2.09	1.58	Do.
Apples (fresh)	do	.30	.31	.27	Do.
Pears (fresh)	do	.28	Trace	None	Do.
Corn (whole grain)	do	.70	do	Trace	2 pounds CH_3Br/1,000 cubic feet for 24 hours.
Corn meal (white)	do	5.82	3.26	2.90	Do.
Wheat (whole grain)	do	0.95	Trace	Trace	Do.
Flour (white)	do	11.10	4.54	4.26	Do.
Flour (whole wheat)	do	7.44	6.35	5.18	Do.
Oats (whole grain)	Trace	4.00	2.96	2.60	Do.
Rolled oats	do	17.24	14.68	13.02	Do.
Barley (whole grain)	do	.52	Trace	Trace	Do.
Rice (brown) (whole grain)	None	1.58	1.38	1.22	Do.
Raisins (seedless)	do	.36	.28	.26	Do.
Peaches (dried)	1.44	2.31	1.86	1.60	Do.
Apricots (dried)	.90	1.89		1.18	Do.
Prunes (processed)	None	.27	Trace	Trace	Do.
Pecans (whole nut)	do	7.00	7.00	6.90	Do.
Peanuts (whole nut unroasted)	do	5.04	5.00	5.00	Do.
Pecan nut meats	do	21.50	13.14	12.66	Do.
English walnut meats	do	11.50	8.70	7.44	Do.
Cashew nut meats (unroasted)	do	22.92	15.20	14.88	Do.
Peanuts (shelled unroasted)	do	7.88	5.46	4.74	Do.
Cheese (yellow American)	.85	8.01	8.10	7.65	Do.

[1] Values are not corrected for moisture content of sample. Results are average of 3 or more determinations on samples from same lot of material.

In this connection, it was found that the surface area exposed to the gas is an important factor in determining methyl bromide adsorption. Adsorption is greater during fumigation in the more finely divided foods. It was also found that wheat flour, when fumigated in a cloth bag or paper package, adsorbed less fumigant than unpackaged flour.

Table 2 presents analytical results on samples of foodstuffs fumigated under commercial conditions.

TABLE 2.—*Bromide content of some foodstuffs following fumigation with CH_3Br under commercial conditions* [1]

Sample	Mg. Br/100 gm. Before fumigation	Mg. Br/100 gm. After fumigation	Dosage CH_3Br	Remarks
Raisins, seedless	0.56	0.86	3 pounds CH_3Br/3,100 cubic feet—15½ hours.	Shipped to laboratory in sealed cans. Time of sampling after fumigation not given.
Prunes, dried	0.39	0.48	4 pounds CH_3Br/1,988 cubic feet for 15 hours.[2]	Do.
Peaches, dried	0.40	1.97	do.[2]	Do.
Flour, white:				
Mill No. 1:				
First floor	0.35	5.03	1 pound CH_3Br/1,000 cubic feet for 24 hours.	Samples taken 48 hours after completion of fumigation. Shipped to laboratory in sealed cans.
Second floor	0.56	7.76	do	Do.
Mill No. 2: First floor		7.70	1 pound CH_3Br/1,000 cubic feet for 19½ hours.	
Cheese (yellow)		3.42	Commercial sample.	History unknown.

[1] Values are not corrected for moisture content of sample. Results are average of 3 or more determinations on samples from same lot of material.
[2] Box-car fumigation.

Table 3 shows the calculated methyl bromide content of foodstuffs 24 hours after completion of methyl bromide fumigation of our samples.

These values are based on the difference between the bromide content of the unfumigated samples and that of the samples taken 24 hours after completion of fumigation. They are calculated on the assumption that all excess bromide is present as methyl bromide. Table 3 also gives for comparison the calculated methyl bromide contents of foodstuffs analyzed and reported by Mackie (*2*), McLaine and Munro (*4*), and Stenger et al. (*5*, *6*). Although these authors do not give the time interval between the end of fumigation and the sampling, a fair agreement between their results and those presented here may be noted. The finding of Stenger, Shrader, and Beshgetoor (*6*) that milled grains and foodstuffs containing relatively high percentages of fat absorbed methyl bromide to a marked degree was confirmed.

Neufeld (*7*) and Damiens and Blaignan (*8*) have made an extensive study of the normal bromide content of fruits, vegetables, and animal matter. Table 4 presents selected values from Neufeld's and Damiens' results. These figures indicate that the bromide content of vegetable products is low in comparison with the values given herein for fumigated products.

TABLE 3.—*Calculated* CH_3Br *content of fumigated foodstuffs compared with results obtained by other investigators*

Sample	CH_3Br content of foodstuffs 24 hours following fumigation (present study) CH_3Br p. p. m.[1]	Mackie (*2*), McLaine and Munro (*4*) CH_3Br p. p. m.[2]	Stenger et al. (*5, 6*) CH_3Br p. p. m.[2]
White potatoes (whole)	----------	14	28
Peel	13	----------	----------
Pulp	6	----------	----------
Sweet potatoes:			
Peel	18	----------	----------
Pulp	5	----------	----------
Green beans	44	----------	----------
Tomatoes	13	6	----------
Eggplant	24	----------	----------
Onions	7	2	----------
Beets	36	----------	----------
Carrots	15	----------	----------
Cabbage	----------	17	----------
Turnips	25	----------	----------
Peas	----------	15	----------
Cauliflower	----------	16	----------
Apples (fresh)	4	1	----------
Pears (fresh)	Trace	----------	----------
Prunes, dried	Trace	----------	3
Figs, dried	----------	----------	7
Peaches, dried	5	----------	23
Apricots, dried	8	----------	----------
Raisins	3	----------	4
Wheat, whole grain	Trace	----------	----------
Corn, whole grain	Trace	----------	----------
Oats, whole grain	36	----------	----------
Rice, whole grain	17	----------	8
Flour:			
White	55	----------	----------
Whole wheat	76	----------	109
Corn meal	39	----------	----------
Oats, rolled	176	----------	----------
Farina	----------	----------	54
Hominy	----------	----------	18
Peanuts	66	----------	----------
Cashew nut meats	182	----------	97
Pecan nut meats	158	----------	234
Cheese (yellow American)	87	----------	90

[1] Parts CH_3Br per million (mg. CH_3Br/kilo of sample) are computed as follows from values shown in table 1.

$$12\times\left[\left(\begin{matrix}\text{Br content 24 hrs. after fumigation}\\ \text{(mg./100 gm.)}\end{matrix}\right)-\left(\begin{matrix}\text{Br content before}\\ \text{fumigation (mg./100 gm.)}\end{matrix}\right)\right]=CH_3Br,\text{ p. p. m.}$$

[2] The results of analyses reported by Mackie (*2*), McLaine and Munro (*4*), and by Stenger et al. (*5, 6*) are expressed either in percent bromine or p. p. m. Br. Since their publications do not show the time of sampling after fumigation, we have computed the apparent CH_3Br content of their samples, as well as the CH_3Br content of our samples, which were analyzed 24 hours after completion of fumigation. (See table 1 for original values.)

No published work is available on the chemical nature of the bromide residues remaining on the fumigated products. Methyl bromide may be hydrolyzed to methanol and hydrogen bromide, and it is probable that during the fumigation of many foodstuffs this reaction occurs. The formation of complex organic bromides by the action of methyl bromide or of hydrogen bromide is also a probability.

The excess bromide, as determined in the procedure outlined above, is expressed in terms of methyl bromide in table 3 in order to give a

basis of comparison for the amount of bromide retained by the fumigated animal feeds.

TABLE 4.—*Bromide content of some common foodstuffs*

Material	Mg. Br/100 gm. of sample (dry weight)		Material	Mg. Br/100 gm. of sample (dry weight)	
	From Neufeld [1]	From Damiens and Blaignan [2]		From Neufeld [1]	From Damiens and Blaignan [2]
Rye	0.5	0.19	Lettuce	1.9	----------
Corn	0.6	0.15-0.19	Cucumber	4.0	----------
Wheat	0.1-1.10	0.21	Onions, garlic, etc.	----------	0.10-0.52
Rhubarb	0.9	0.75	Beets	None	0.37-0.55
Turnip	2.40	0.31-0.89	Apple	0.3	Trace
Cabbage	0.2-2.50	0.45	Pear	0.6	----------
Carrots	T-3.60	0.39	Peach	None	T-0.47
Potatoes	None	0.27-1.43	Grapes	T-1.10	0.195
Tomatoes	0.3-1.4	0.95-5.34			

[1] Neufeld (7) used essentially the same analytical procedure as that used in this study, except a microchemical modification. Results are expressed in the original paper as percent Br.
[2] Damiens and Blaignan (5) express their results as mg. Br/100 gm. sample (dry weight). The analytical method was based on colorimetric procedures.
Note that the values given in this table are for dry weight of samples, whereas the values shown in tables 1 and 2 are for samples in the usual state.

It is not substantiated by certain of our findings that cooking markedly reduces the quantity of bromide residue. In the case of fumigated flour, we mixed 100-gram portions with water into a stiff dough and baked at 175° to 200° C. for 1 hour. The resulting loss of bromide during this procedure approximated 10 percent of the total amount present. Cooking of dried fruits and of certain fresh vegetables produced little change in the total bromides if the water and juices remained in the sample.

For ease in comparing the results on various samples of foodstuffs, the excess bromide content of the samples following fumigation may be expressed as parts of methyl bromide per million (mg. CH_3Br/kilo of sample), although this volatile compound is probably present only in small amounts 48 hours after fumigation. These values (p. p. m.) may be calculated as follows:

$$12\times\left[\begin{array}{c}\text{(Final bromide content)}\\ \text{mg. per 100 gm.}\end{array} - \begin{array}{c}\text{(Original bromide content)}\\ \text{mg. per 100 gm.}\end{array}\right] = \begin{array}{c}\text{Parts}\\ CH_3Br\\ \text{per}\\ \text{million}\end{array}$$

Figure 1 shows the drum type fumigator used in the experimental fumigation work in this laboratory. This fumigator was constructed from a 55 gallon alcohol drum with a special galvanized sheet steel cover. A fumigator drum of this type was developed by the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture, for use in certain of their experimental work. Its design

suited the purpose of our work so a similar drum was used in these experiments.

The method of fumigation was to place in the drum those materials which were to be fumigated, start the electric fan, and pour into the top vent the required quantity of cooled liquid methyl bromide. The

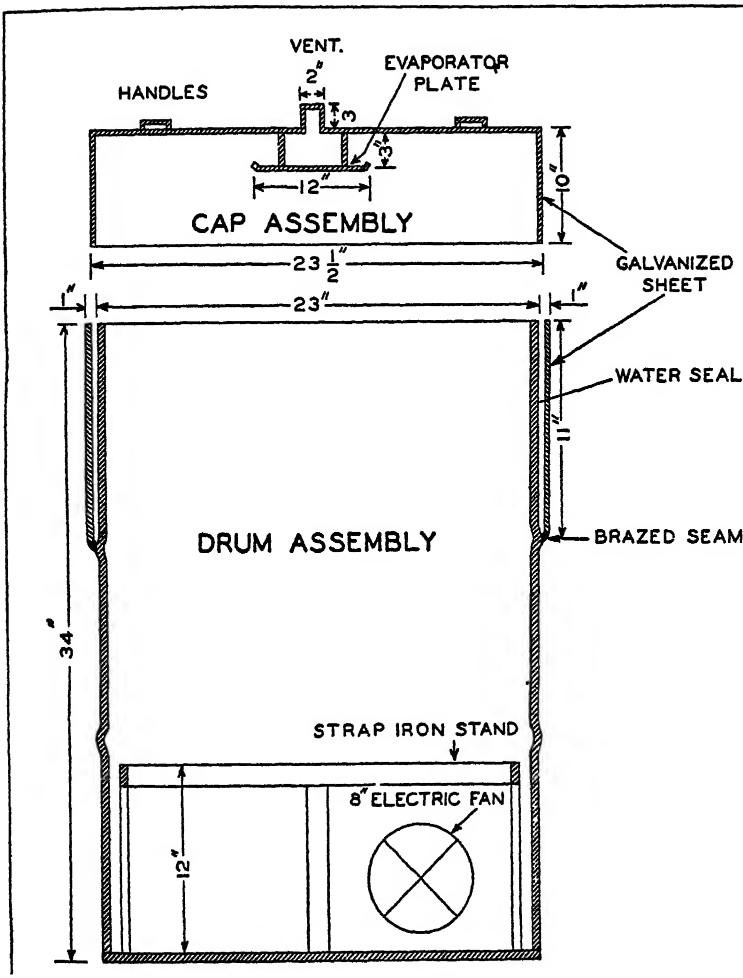

FIGURE 1.—Fumigator drum used for experimental fumigation of foodstuffs.

vent was closed with a rubber stopper. The methyl bromide cylinder was cooled in a refrigerator to about 5° to 6° C. A cooled graduate was then used to measure the amount of liquid methyl bromide necessary to establish the desired concentration. By working with a cold cylinder and graduate, accurate measurements could be made conveniently.

FEEDING EXPERIMENTS

Feeding experiments utilizing diets containing moderate and excessive amounts of methyl bromide were carried out with young white rats and rabbits.

The rat feeding experiments were made in three groups: The first was a preliminary 8-week feeding test; the second continued 16 weeks; and the third group of rats was fed various fumigated diets for 20 weeks. The rabbit feeding experiments were carried on for 52 weeks. Studies were also made on the acute effects on rabbits of single doses of methyl bromide fed in olive oil solution.

The rat and rabbit feeding experiments are later described under appropriate headings. Results of the 20-week rat and 52-week rabbit feedings are given in detail together with weight curves and other pertinent data.

TABLE 5.—*Bromide content of materials fumigated and fed to experimental animals*

Foodstuffs	Mg. Br/100 gm.[1]				Dosage CH_3Br atmospheric pressure 20–25° C.
	Before fumigation (control)	Immediately after fumigation	24 hours after fumigation	48 hours after fumigation	
	Rat feedings—20 weeks				
Rat pellets[2]	5.20	620.0	529.0		Undiluted CH_3Br gas for 24 hours.
Do.[2]	5.20	28.9	26.3	24.7	3 pounds CH_3Br/1,000 cubic feet for 24 hours.
Cheese	0.73	24.0	18.2		Do.
Peanuts	Trace	7.09	7.00		Do.
Whole sweetpotatoes	Trace	5.80	5.61		Do.
Whole white potatoes	1.11	4.04	4.08		Do.
Green beans	0.68	6.02	5.62		Do.
Dried peaches	0.68	1.55	1.33		Do.
	Rabbit feedings—52 weeks				
Rabbit pellets-oats mixture[3]	1.00	311.0	256.0		Undiluted CH_3Br gas for 24 hours.
Alfalfa hay	Trace	362.3	360.8		Do.
Rabbit pellets-oats mixture[3]	1.00	9.36	9.12	7.84	3 pounds CH_3Br/1,000 cubic feet for 24 hours.
Alfalfa hay	Trace	7.15	6.75	5.55	Do.

[1] Results shown are average of 3 or more determinations by method of Dudley (5). No correction for moisture content.
[2] A commercial, mixed, balanced dog and rat food. In pellets about ½"×½"×1". Fat content rather high.
[3] A mixture consisting of one-half oats and one-half rabbit pellets. Rabbit pellets were a commercial, prepared rabbit food.

NOTE: To calculate the apparent CH_3Br content of the animal foods, the following formula may be used:

$$12\times\left[\left(\frac{\text{Final Br content}}{\text{per 100 gm.}}\right)-\left(\frac{\text{Original Br content}}{\text{per 100 gm.}}\right)\right]=\text{Parts } CH_3Br \text{ per million or mg. } CH_3Br \text{ per kilo.}$$

The CH_3Br content of the animal foods has been calculated by this method and appears in the tables describing the animal tests as CH_3Br, p. p. m.

In table 5 are shown the results of analyses of the several food mixtures and dietary components of the rat- and rabbit-feeding experiments. A footnote to table 5 gives the method of calculating the

amount of methyl bromide retained by the various foodstuffs. These calculated values appear in the tables describing the animal feeding as the amount of methyl bromide (p. p. m. or mg. CH_3Br per kilo of food) retained by the food and consumed by the test animals.

The majority of animal diets were treated with 3 pounds of methyl bromide per 1,000 cubic feet in the drum fumigator (fig. 1). The diets which were fumigated in the drum fumigator were treated as were the foods used for analysis (table 1), except that the diets were all fumigated at a concentration of 3 pounds of CH_3Br/1,000 cubic feet for 24 hours. The diets to be fumigated in an atmosphere of methyl bromide gas were placed in a vacuum desiccator, which was evacuated to a pressure of about 10 mm. Hg; the gaseous methyl bromide was then led into the desiccator, so as to bring the pressure to atmospheric, and the food was allowed to remain in this atmosphere of methyl bromide for 24 hours.

The greater absorption of methyl bromide by the rat pellets, when compared with rabbit pellets fumigated under the same conditions, is due to the much greater fat content of the rat food.

RAT FEEDING EXPERIMENTS

A. A preliminary series of tests was made to determine the approximate upper level at which methyl bromide produced toxic effects. These consisted of feeding rats a commercial rat food fumigated for 24 hours in an atmosphere of methyl bromide gas. The animals were fed immediately after fumigation. (Concentration of methyl bromide on the food averaged 6,830 p. p. m.) Deleterious effects were observed in a feeding period of 8 weeks. These animals developed diarrhea during the first 3 weeks, after which the condition subsided. Weight gains of these animals were slight, their general condition was poor, and reproduction ceased.

B. Sixteen-week feeding experiments: Following the preliminary 8-week feeding experiments a series of rats was fed for 16 weeks on various diets fumigated with methyl bromide. There occurred an epizootic of pneumonia throughout this colony during these feeding tests, unrelated to the methyl bromide exposure, so that results failed to bring out clearly the effects of methyl bromide treated foods on this group of rats. However, it was learned that concentrations of methyl bromide in the range of 1,550 p. p. m. caused sleepiness, reduced activity, increased death rates, decreased weight gains, and caused cessation of reproduction. The more important findings resulted when rats that had been fed on this 1,550 p. p. m. diet were placed on a normal diet. Within 4 weeks the weight of the survivors had increased markedly, general condition was excellent, and reproduction was normal. The females were able to raise their litters.

These results indicated that the effects of this diet were largely transitory. In later work (20-week rat feeding tests), additional study was made of the effects of such feeding on reproduction.

C. Twenty-week feeding experiments: To study further the effects of various foods fumigated with methyl bromide, four series of tests were run over a period of 20 weeks with young white rats. The details and results of these tests are given in table 6. Figures 2 and 3 show the average weight curves of the animals.

TABLE 6.—*Rat feeding tests, 20 weeks*

Number	Number of rats on test	CH_3Br content of food (p. p. m.) [1]	Treatment of food and feeding program [2]	Results
1 (control)	36	None (unfumigated)	Rat pellets (*ad lib.*), unfumigated.	Excellent weight gains (1 death). General condition good.[4]
		(*Time fed after fumigation*)		
2	36	Rat pellets: At once, 284. In 24 hours, 253. Average, 270.	Rat pellets (*ad lib.*), fumigated for 24 hours at 3 pounds CH_3Br/1,000 cubic feet. Fed immediately after fumigation.	Good weight gains (4 deaths). General condition good. Reproduction normal. Average weight gains, 10 percent below controls. No significant pathology.[4]
3	36	Rat pellets: In 24 hours, 253. In 48 hours, 234. Average, 245.	Same diet as for run 2 except food aerated for 24 hours before feeding.	Good weight gains (2 deaths). General condition good. Reproduction normal. Average weight gains, 11 percent below controls. No significant pathology.[4]
4	36	Rat pellets: At once, 7,375. In 24 hours, 6,285. Average, 6,830.	Rat pellets (*ad lib.*), fumigated for 24 hours with undiluted CH_3Br gas. Fed immediately after fumigation.	Condition poor (15 deaths). Weight gains slight, 30 percent below controls. No reproduction. Activity reduced. Little significant histopathology.[4]
5 (control)	36	None (unfumigated)	½ diet rat pellets, remainder made up of 3 of following articles: sweet potatoes, potatoes, green beans, dried peaches, cheese, peanuts. Pellets and others all unfumigated.	Condition excellent (4 deaths). Weight gains good.[5] Reproduction normal.
		(*At once* / *In 24 hours*)		
6	36	Rat pellets 284 / 253; Potatoes 35 / 35; Sweet potatoes 70 / 67; Green beans 64 / 59; Dried peaches 10 / 8; Cheese 279 / 210; Peanuts[3] 85 / 84	Same diet as for run 5 except pellets and all other foods fumigated for 24 hours with 3 pounds CH_3Br/1,000 cubic feet and fed immediately after fumigation.	Condition excellent (3 deaths). Weight gains good.[5] Reproduction normal. Weight gains equal to controls in run 5. No significant pathology.

[1] CH Br content based on values shown in table 5. See footnote to table 5 for method of calculation.
[2] As rats ate varying quantities of food no estimate can be given of total daily CH_3Br intake.
[3] As foodstuffs other than rat pellets were varied from week to week, no estimate can be given of CH_3Br level. At all times either cheese or peanuts were given. This diet simulates a normal human diet, in which are included those materials which absorb the greatest amounts of CH_3Br.
[4] See figure 2 for weight curves.
[5] See figure 3 for weight curves.

Examination of the results of these tests shows that the 36 rats receiving a diet containing an average methyl bromide content of 6,830 p. p. m. were adversely affected. All developed partial paralysis of the hind quarters for the first 3 or 4 weeks of the test, and during this time 12 of the animals died. Most of those that survived this

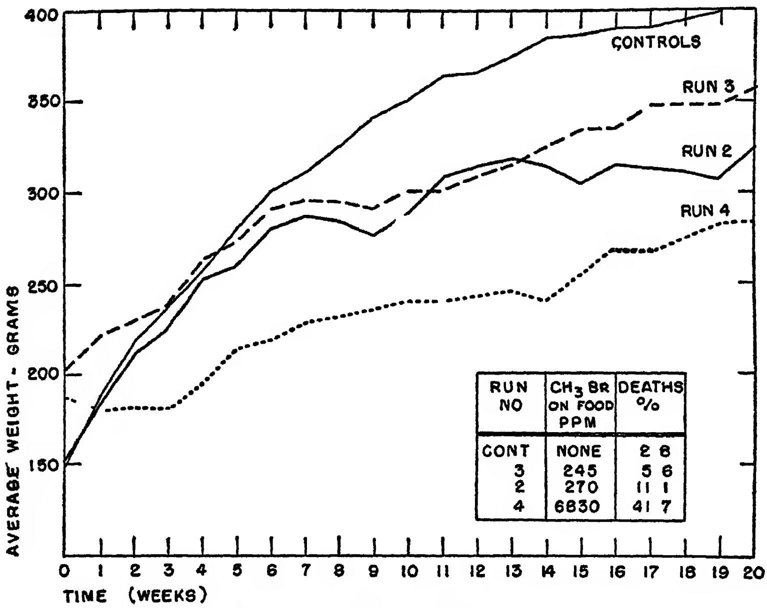

FIGURE 2 —Weight curves of rats fed on fumigated pellets. (See table 6 for letails of feeding and resi

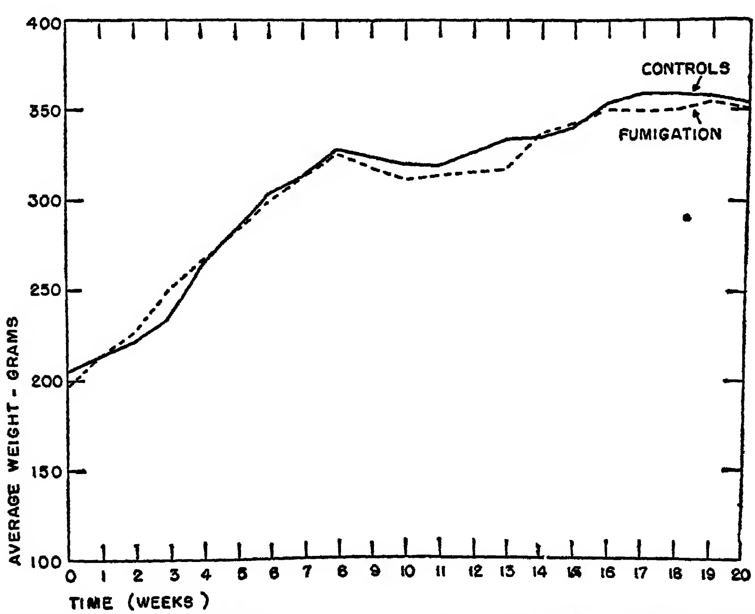

FIGURE 3.—Weight curves of rats fed on mixed diet containing fruits, vegetables, cheese, and peanuts (See table 6, runs 5 and 6, for details of feeding and results.)

period began to gain weight slowly but were in generally poor condition. The partial paralysis cleared completely after the fifth week of feeding. During the tenth through the fifteenth week of the test, the animals developed scaly tails, eye lesions similar to xerophthalmia, and loss of hair. These conditions improved somewhat so that at the end of the twentieth week the 21 survivors were in fair condition, with hair and eyes normal, but with scaly tails. During the entire test the animals showed marked inactivity, reduced food intake, and loss of reproduction.

At the end of the 20-week feeding period, 12 of the survivors were killed for pathological study, while 9 were placed on the same but unfumigated diet, whereupon they showed moderate weight gains, and a slowly improved condition. Females gave birth to litters 12 weeks after being placed on the normal diet, but the young were not raised. In general the rats showed residual symptoms (no deaths) after 20 weeks on the normal diet, indicating that the effects of the diet containing 6,830 p. p. m. of methyl bromide were more or less permanent in character. This finding is significant in the light of the results obtained with rats which had been fed for 16 weeks on a diet containing 1,550 p. p. m. of methyl bromide; they were able to regain their normal condition and successfully raise their litters after but 4 weeks on an unfumigated diet.

No deleterious effects were noted in two series of rats receiving for 20 weeks rat pellets fumigated at a concentration of 3 pounds of CH_3Br per 1,000 cubic feet for 24 hours. Concentration in the feed ranged between 245 and 270 parts of CH_3Br per million. There was a slight reduction in average weight gains. (See table 6 and figure 2.)

Rats fed for 20 weeks on a mixed diet containing fresh vegetables, peanuts, cheese, dried fruits, and rat pellets fumigated with 3 pounds of CH_3Br per 1,000 cubic feet were entirely normal in every respect. In weight gains, reproduction, and general condition they equalled the control rats fed on the same unfumigated diet. (See table 6 and figure 3.)

Detailed research on the mechanism of the various manifestations noted in the rats, particularly with regard to nutritional effects of vitamin supplements, is desirable. However, owing to the urgent demand for information covering the potential toxicity of foodstuffs fumigated with methyl bromide, time did not permit us to go into this phase of the study.

RABBIT EXPERIMENTS

Minimum lethal dose: In order to determine the minimum lethal dose of methyl bromide for rabbits by ingestion, an olive oil solution of methyl bromide containing 34.4 mg. of methyl bromide per cc. was introduced into the esophagus through the mouth of each animal

by means of a long, blunt, hollow needle attached to a 5 cc. tuberculin syringe. Dosage varied from 1 to 5 cc. of the olive oil-methyl bromide mixture. To prevent volatilization of the methyl bromide from the oil solution, both solution and syringe were cooled to about 5° C. Results of these tests were shown in table 7. According to these data the minimum lethal dose of methyl bromide for rabbits by ingestion is 60–65 mg. per kilo of body weight.

TABLE 7.—*Determination of minimum lethal dose of methyl bromide for rabbits by ingestion of methyl bromide in olive oil*

Animal's weight (gm.)	Oil mixture administered (cc.)[1]	Total CH_3Br (mg.)	Mg. CH_3Br per kilo of bodyweight	Results
2,360	1.0	34.4	14.7	No effect.
2,370	1.7	58.8	24.9	Do.
5,450	5.0	173 0	31.7	Slight to no effect.
2,405	3.0	103.8	43 2	Do.
3,320	5.0	173.0	52.1	Sleepy for 10 hours.
2,540	4.0	138.4	54.5	Sleepy and reduced activity.
2,465	4.0	138.4	56.1	Do.
2,460	4.0	138.4	56.3	Dead in 8 hours
2,300	4.0	138.4	60.2	Slight sleepiness and reduced activity.
2,200	4.0	138.4	62.9	Do.
2,720	5.0	173.0	63.6	Dead in 6 hours.
2,675	5.0	173.0	64.7	Dead in 5 hours.
2,100	4.0	138.4	65.9	Partial paralysis 18 hours. Dead in 70 hours.
2,620	5.0	173.0	66.0	Dead in 4 hours.
2,435	5.0	173.0	71.0	Dead in 5 hours.
2,425	5.0	173.0	71.3	Dead in 6 hours.
Controls				
2,230	5.0 (olive oil only).			No effect.
2,235	do			Do.

[1] 1 cc. olive oil solution contained 34.4 mg. methyl bromide.

RABBIT FEEDING EXPERIMENTS

Three series of rabbits (12 in each group) were fed for 52 weeks on foodstuffs fumigated with methyl bromide for 24 hours. In table 8 are given the feeding schedule and results of these several feeding tests.

The rabbits fed on the foodstuffs fumigated with undiluted methyl bromide gas showed a drop in food intake to about one-half normal as soon as feeding of the fumigated products was begun. A drop in weight also resulted. A progressive paralysis, beginning in the hind quarters of the animals and moving forward, developed 2 to 3 days before death; all died within 2 weeks after feeding was begun. At 3 to 5 hours before death a nearly complete paralysis was observed that affected the fore and hind quarters but not the neck and head. Respiration became retarded and death occurred without convulsions. Animals were apparently conscious until a few minutes before death. Gross autopsy findings were essentially negative. However, in 10 of 12 cases a stomach filled with food to near capacity was noted. In 9 of 12 cases the bladder was found markedly distended with urine, indicating a possible paralysis of the bladder.

Rabbits fed for 52 weeks on foodstuffs fumigated with 3 pounds of methyl bromide per 1,000 cubic feet for 24 hours were in good health throughout the entire time of the test. A few that became ill with an ear infection were killed to prevent spreading the infection. The only difference noted between the animals fed the fumigated diet and the control animals was a 10 to 12 percent reduction in the average weight gains of the former group. Some of these test animals showed a markedly increased water intake and urine excretion.

The effects of methyl bromide on reproduction in rabbits were not determined as the animals were kept in individual cages with no opportunity for breeding.

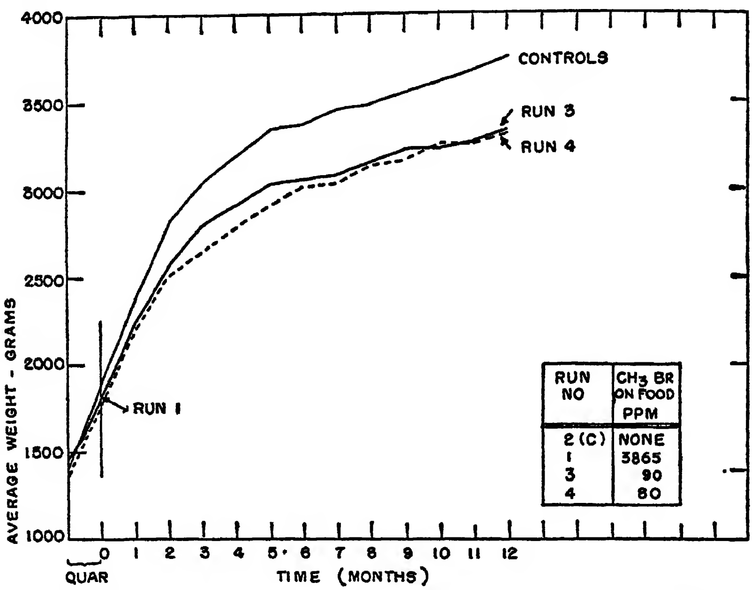

FIGURE 4.—Weight curves of rabbits fed foodstuffs fumigated with methyl bromide. (See table 8 for details of feeding and results. All of run 1 dead in 2 weeks.)

Complete data on the rabbit feeding tests are given in table 8. Figure 4 shows the average weight curves.

It will be noted that 21 of the 36 rats on a diet containing 6,830 p. p. m. methyl bromide survived 20 weeks, while all 12 rabbits receiving a diet containing 3,865 p. p. m. methyl bromide died in 2 weeks. The rats on a diet of from 245 to 270 p. p. m. of methyl bromide showed but slight decrease in weight gains, while rabbits on a diet of 80 to 90 p. p. m. of methyl bromide also showed a slight decrease in average weight gains. Thus it would seem that there is a definite species susceptibility of rabbits since these animals are more affected by similar or lower concentration of methyl bromide in their diet.

TABLE 8.—*Fifty-two-week rabbit feedings of methyl bromide fumigated materials*

Number	Number of rabbits on test	CH_3Br content of food (p. p. m.) [1]	Treatment of food and feeding program [2]	Results
2	12	None, unfumigated...	100 grams pellet-oats mixture per animal per day. 100 grams alfalfa hay per animal 3 times per week. Unfumigated.	3 deaths. General condition excellent. Normal weight increases. All deaths due to ear infection.
		(Time fed after fumigation)		
1	12	Pellets-oats: At once, 3,720. In 24 hours, 3,060. Alfalfa hay: At once, 4,350. In 24 hours, 4,330. Average, 3,865.	100 grams pellet-oats mixture per day. 100 grams alfalfa hay 3 times per week. All food fumigated with undiluted CH_3Br gas, at atmospheric pressure, for 24 hours. Fed immediately after fumigation.	All dead in 2 weeks. Death preceded by marked decrease in food intake and marked drop in weight. In 3 to 5 days before death, progressive paralysis was noted in all animals, beginning in hind quarters and progressing forward. Death occurred without convulsions. Pathologic examination showed cerebral changes; secondary pulmonary damage in all.
3	12	Pellets-oats: At once, 100. In 24 hours, 97. Alfalfa hay: At once, 86. In 24 hours, 81. Average, 90.	100 grams pellet-oats mixture per day. 100 grams alfalfa hay 3 times per week. All food fumigated 24 hours at concentration of 3 lbs. CH_3Br/1,000 cu. ft. Food fed immediately after fumigation.	No deaths. General condition excellent. Average weight increases good but 10 percent less than controls. Marked increase in water intake and urine excretion. Estimated average intake of CH_3Br per animal per day=13.5 mg. CH_3Br. No significant histopathology.[3]
4	12	Pellets-oats: In 24 hours, 97. In 48 hours, 82. Alfalfa hay: In 24 hours, 81. In 48 hours, 67. Average, 80.	Same feeding schedule as in Run 3 but food and hay aerated 24 hours after fumigation, and then fed	3 deaths. General condition excellent. Average weight increases good but 11 percent less than controls. Marked increase in water intake and urine excretion. Estimated average intake of CH_3Br per animal per day=12.0 mg. CH_3Br. No significant histopathology.[3] 2 deaths due to ear infection. 1 death due to intestinal obstruction.

[1] The CH_3Br content (p. p. m. or mg. CH_3Br/kilo of sample) is calculated from the excess Br content of the samples by the method shown in footnote to table 5.

[2] Pellets were a balanced commercially-prepared rabbit food. Pellets and whole grain oats were mixed half and half, and 100 grams of the mixture fed to each animal per day. This amount was regularly completely consumed except in the case of the animals dying in 2 weeks. Dried alfalfa hay was fed 3 times per week, 100 grams per animal per day.

[3] The estimated daily apparent intake of CH_3Br per animal is calculated from the excess Br on the food by striking a general average. This is based on the assumption that all excess Br is present as CH_3Br. The values provide a basis of comparison for the possible intake of man when eating such foods as are shown in tables 1, 2, and 3.

PATHOLOGY

Tissues from 105 rats and 44 rabbits were examined to determine what histopathological changes were produced by the ingestion of food fumigated with methyl bromide. Rather large representative groups of animals from each experiment were killed and examined. A total of 3,400 histological sections was studied.

Paraffin sections were made from the heart, lungs, liver, spleen, pancreas, adrenals, kidneys, stomach, duodenum, jejunum, ileum, large intestine, and, in some animals, the brain and mesenteric lymph nodes. The sections were stained routinely by Lillie's (*9*) modification of the eosin-polychrome methylene blue method. Spleen sections and some

liver sections were stained by ferrocyanide to demonstrate the presence or absence of iron-bearing pigment. Lillie's (*10*) current modification of Gallego's elastic and connective tissue stain was also used when indicated.

Table 9 presents the salient features regarding diet, duration of feeding, concentration of methyl bromide, and number and kind of animals.

TABLE 9.—*Treatment of animals for pathological study*

Diet	Duration of feeding (weeks)	Concentration CH_3Br in food (p. p. m.)	When fed with relation to fumigation	Number of animals studied pathologically
Rabbits				
Olive oil	All dead in 8 hours.	56–71 mg./kg. body weight.		6
Mixed	All dead in 14 days.	3,865	At once	12
Do	52	90	do	12
Do	52	80	24 hours later	9
Do	52	0	Controls	5
Rats				
Stock	16	1,550	At once	32
Pellets	20	6,830	do	12
Do	20	270	do	15
Do	20	245	24 hours later	12
Do	20	0	Controls	10
Vegetables and pellets	20	Various	At once	12
Do	20	0	Controls	12

The pathological changes found in the animals fed methyl bromide fumigated food were not striking except in the series in which rabbits received methyl bromide in oil by intubation and the series in which rabbits received food containing a high concentration of the fumigant.

Minimum lethal dose (CH_3Br in olive oil).—A series of 6 rabbits was given a single dose of from 56 to 71 mg. of methyl bromide in olive oil per kilo of body weight. A rabbit receiving 56 mg. per kilo died in 8 hours. The others receiving from 65 to 71 mg. died between 4 and 5½ hours after intubation.

The most prominent changes occurred in the gastrointestinal tract. Grossly, the fundus of the stomach showed a marked congestion with scattered, punched-out areas of the mucosa, and superficial hemorrhages. Areas of destruction of the surface epithelial cells were noted microscopically. The mucosa was covered by a thick layer of fibrinous exudate containing, at intervals, desquamated epithelial cells. Areas of hemorrhage in the mucosa, underlying denuded regions, were present and regions of marked hyperemia were noted.

Marked desquamation of the mucosa of the duodenum was noted in 5 of the animals and was least prominent in the rabbit which died in 8 hours after receiving 56 mg. per kilo. A layer of fibrinous exu-

date in which were scattered clumps of cells, isolated swollen cells with small, dense nuclei, and nuclear debris, covered the mucosa. Slight to moderately marked congestion of the mucosa was present in all of the animals and the degree of congestion showed no relation to the size of the dose. Superficial hemorrhages in the villi, at or near the tips, were found in a few sections.

Desquamation of the mucosa of the jejunum was noted in only 2 of the rabbits and 3 showed a slight to moderate congestion of the capillaries of the mucosa. The damage to the jejunum was much less prominent and frequent than damage to the duodenum.

No changes of note were seen in the ileum or large intestine. In general, the findings resemble the effects of an acute irritation.

Changes in the other organs were neither conspicuous nor important. The spleen showed a slight to marked amount of iron-bearing pigment in all of the animals, but this also was noted in the controls. Moderate to marked congestion of the cavernous veins, occasionally with small interstitial hemorrhages, was present. The Malpighian corpuscles were generally large and well defined. In the lungs slight to moderate congestion of the interalveolar capillaries was the only finding and this could probably be of agonal origin. Moderate to marked congestion of the interstitial capillaries of the kidney with occasional slight injection of the glomeruli was noted. The heart, liver, pancreas, and adrenals were essentially negative.

Food fumigated with concentrated CH_3Br (death in 2 weeks).—A group of 12 rabbits was fed a mixed diet consisting of hay, pellets, and oats which had been fumigated in an atmosphere of concentrated methyl bromide gas for 24 hours. They were fed immediately after the fumigation was completed and the average methyl bromide content of the food was 3,865 parts per million. The first animal died 3 days after feeding was begun and the last in 13 days.

The gastrointestinal tract was essentially normal. A few scattered areas of desquamation of surface epithelium were found in the duodenum and jejunum of only 2 of the animals. The stomach, ileum, and large intestine showed nothing of note.

Subacute interstitial nephritis, usually very slight, was present in 5 rabbits and moderate congestion of the interstitial capillaries of the cortex and medulla was noted in 3 animals, accompanying the nephritis in 2. Bronchopneumonia occurred in 8 of the animals, acute diffuse pneumonitis in 2, and purulent bronchitis in 2. All showed acute respiratory damage. This may be coincidental or the result of inhalation of residual methyl bromide in the food.

A very slight to moderate amount of brown pigment occurred in the liver cells of 7 animals. This did not give the iron reaction with potassium ferrocyanide. Hemosiderin was demonstrated in the

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spleen of 2 animals and appeared to be of no importance. Slight to marked congestion of the cavernous veins was noted in all but 1 rabbit.

Sections from the brain showed slight to moderate congestion of the capillaries of the cerebral cortex and medulla in 3 animals, and an occasional small, focal, perivascular area of lymphocytic infiltration in 3 others. No changes of the cerebellar cortex were noted. Studies of sections of the upper and lower segments of the cervical, thoracic, and lumbar portions of the spinal cord and a section of the sacral cord and large nerve trunks leading to the affected parts of 5 monkeys and 2 rabbits exposed to methyl bromide by inhalation failed to show evidence of myelin degeneration. This material was supplied by Dr. D. D. Irish, whose report of the investigation of the effects of methyl bromide by inhalation is now in press.

The heart, pancreas, and adrenals showed no changes of note.

Fifty-two-week feeding tests.—Two groups of 12 and 9 rabbits, respectively, and one of 5 rabbits for control were fed a mixed diet of hay, oats, and pellets for 52 weeks. The food was fumigated for 24 hours with a concentration of 3 pounds of methyl bromide per 1,000 cubic feet. One series of animals was fed immediately after the food was removed from the fumigator. This diet had an average concentration of 90 parts of methyl bromide per million. The other lot of animals was fed after the food had been allowed to stand for 24 hours following fumigation. The methyl bromide content of this diet averaged 80 parts per million. The controls received the same diet but without fumigation. The animals were killed and examined at the end of 52 weeks. Inasmuch as the tissues showed essentially the same findings in each group of exposed animals, these experiments will be discussed together.

No changes were noted in the gastrointestinal tract in either group or in the controls. In the lungs, scattered single alveoli and areas of alveoli filled with red blood cells and varying in numbers were noted. Since these animals were killed by a blow on the head, this finding could not be attributed to the methyl bromide. No pneumonia was present in any of the animals. A small area of interstitial fibrosis with lymphocytic infiltration, accompanied by local dilation of tubules, was noted in the kidney of only one animal—this from the group fed immediately after the fumigation of the food.

Relatively large amounts of iron-bearing pigment were found in the spleens but a somewhat lesser amount also occurred in the spleens of the control animals. The liver, heart, pancreas, and adrenals were essentially normal.

RATS

Food containing 1,550 p. p. m. (1–16-week feeding).—A series of 32 rats was fed a specially prepared stock diet fumigated for 24 hours with undiluted methyl bromide gas. They were fed immediately after fumigation and the concentration of the methyl bromide averaged 1,550 parts per million in the food. Groups of these animals were killed at 1- or 2-week intervals over a period of 16 weeks especially for pathological study.

Very few changes were observed in these animals. Bronchopneumonia occurred in 5 rats, and purulent bronchitis in 6 others. In the spleen the presence of pigment, free and in the cells of the splenic pulp, was conspicuous but this was also noted in the controls and in other series of rats studied. The cavernous veins were filled with blood and a slight to marked perifollicular zone of anemia was usually present, which varied in size inversely with the amount of blood in the pulp. Slight to moderate phagocytosis of nuclear fragments in the follicles was also seen. Infiltration of the muscular trabeculae was less frequently noted.

The gastrointestinal tract was normal throughout. The liver, heart, pancreas, kidneys, adrenals, and mesenteric lymph nodes showed nothing of note.

Food containing 6,830 p. p. m. (20-week feeding).—A group of 12 rats was fed for 20 weeks with pellets fumigated for 24 hours with pure methyl bromide. Animals were fed immediately after fumigation and the concentration of methyl bromide in food averaged 6,830 parts per million. All of the animals studied were killed and examined at the end of 20 weeks.

In this series pneumonia occurred in only one animal. The spleen showed findings similar to those encountered in the previous groups; however, the perifollicular anemia and phagocytosis were more marked. The gastrointestinal tract, liver, kidneys, adrenals, heart, pancreas, and mesenteric lymph nodes showed no histopathological changes.

Food containing 245–270 p. p. m. (20-week feeding).—Two groups of 12 and 15 rats were fed pellets fumigated with 3 pounds of methyl bromide per 1,000 cubic feet for 24 hours. One group was fed immediately after fumigation, the food having an average methyl bromide content of 270 parts per million. The other group was fed 24 hours after the food was fumigated, the food containing an average of 245 parts per million. A group of 10 rats receiving unfumigated pellets served as controls. All were killed and examined 20 weeks after feeding was begun.

In this entire lot of animals only one showed pneumonia. The gastrointestinal tract showed no histopathological changes. The spleen presented findings similar to those in the controls for the

previous series of rats. The liver, heart, kidneys, adrenals, pancreas, and mesenteric lymph nodes showed nothing of note.

A group of 12 animals was fed a mixed and vegetable diet fumigated with 3 pounds of methyl bromide per 1,000 cubic feet for 24 hours. Feeding took place immediately after fumigation. A similar number of rats, used as controls, was fed the same diet but without fumigation. All were killed and examined at the end of 20 weeks.

Here again the pathological findings were essentially the same as those encountered in the previous exposures in which rats were used. Pneumonia (acute diffuse pneumonitis) was encountered in 2 of the exposed animals but subacute bronchopneumonia was also found in one of the controls. The findings in the spleen were similar to those described above. The gastrointestinal tract, liver, heart, kidneys, adrenals, pancreas, and mesenteric lymph nodes were essentially negative.

DISCUSSION

Under normal conditions of fumigation, that is, those approved by the United States Department of Agriculture and now recommended by the principal manufacturers of methyl bromide, fresh fruits and vegetables are fumigated at atmospheric pressure for 2 hours or less with concentrations approximating 2 to 2½ pounds of methyl bromide per 1,000 cubic feet of fumigated space. Dried fruits are fumigated at concentrations of 2 pounds or less of methyl bromide per 1,000 cubic feet for periods of 15 to 24 hours, while milled grains usually receive a dosage of 1 pound of methyl bromide per 1,000 cubic feet for about 24 hours.

In the experiments reported here, the foodstuffs fumigated for analysis were carried through procedures approximating the usual commercial fumigation practices. Dried fruits, flour, nuts, and cheese were fumigated at 2 pounds of methyl bromide per 1,000 cubic feet for 24 hours. Fresh fruits and vegetables were fumigated at the same concentrations for 2 hours. As these concentrations of fumigant and time of fumigation approximate commercial practice, it is reasonable to assume that the amount of bromides retained by the foodstuffs after laboratory fumigation is of the same order of magnitude as would be retained by foods fumigated in larger quantities.

The fumigation of materials used in the animal feeding experiments was, in all cases, at a concentration (3 pounds of methyl bromide per 1,000 cubic feet) above those usually used in actual practice. Likewise, the period of fumigation in all cases was 24 hours. These facts explain why the bromide content of the rat feed was higher than that of corresponding foodstuffs fumigated by the usual procedure (usually 2 pounds of methyl bromide per 1,000 cubic feet).

In actual practice the use of excessive concentrations of methyl bromide or of lengthy fumigation periods is discouraged because fresh fruits and vegetables are harmed by such procedures. In the case of other foodstuffs, the tendency is to use the lowest effective concentration because of the cost of the fumigant. Excessive and rapid deterioration of the fresh produce is caused by high dosage, prolonged fumigation, or high temperatures. These conditions also tend to cause excessive absorption of the fumigant.

Materials containing relatively large amounts of fats and oils will absorb larger amounts of methyl bromide during fumigation because of its solubility in fats. However, from the reports of some experimental fumigators it seems that fresh produce containing relatively high concentration of oils is readily damaged by methyl bromide fumigation. When the common foodstuffs were fumigated in this laboratory at a concentration of 2 pounds of methyl bromide per 1,000 cubic feet, no change in color, odor, taste, or texture was noted. This statement holds true for fruits eaten raw and for vegetables following cooking.

Because of the greater absorption capacity of milled grains, and the solubility of methyl bromide in oily or fatty foods (i. e., cheese, nutmeats, nuts, etc.) it is suggested that the use of methyl bromide as a fumigant for these materials be limited for the present to experimental trials. Until a more complete picture is to be had of the commercial methods of fumigation of these products, together with the results of a considerable number of experimental procedures now being studied in industrial and governmental laboratories, the use of methyl bromide as a routine fumigant for those materials that absorb considerable amounts of the gas is inadvisable.

When the more absorptive foods (rat and rabbit pellets, hay) were fumigated with 3 pounds of methyl bromide per 1,000 cubic feet and fed to rabbits and rats, the animals remained in good condition and made good weight gains. The gain in weight of these test animals was, however, 10 to 12 percent below the gains made by control animals fed the same diets, unfumigated. No other changes were noted during the test periods or after autopsy and histopathological examination.

Hanzlik, Talbot, and Gibson (*11*), after feeding rats sodium bromide (0.5 to 0.6 mg. NaBr per day) for a period of 7 months, observed no significant changes except a diminished weight. These test animals lost 11 percent in weight with but a 2.2 percent decrease in food intake. Lethargy or narcosis was not observed at any time. It is probable that the diminished weight gains noted in the animals fed on foodstuffs containing moderate concentrations of residual bromides are due to the effects of inorganic bromides resulting from hydrolysis of methyl bromide.

In those animals fed on foodstuffs fumigated with undiluted methyl bromide gas and the rabbits treated with methyl bromide in oil, the effects seem to be in large part due to the direct action of methyl bromide.

Previously in this paper, when discussing the amount of methyl bromide taken up by the various materials during fumigation, references were made to the absorptive and adsorptive capacity of the product. Inasmuch as no study has been made of the nature of the residues remaining in the fumigated material, nor the physicochemical mechanisms by which the gas is held by the produce, it is not possible at this time to state the nature of the residue. Therefore, the question of the forms of bromides present, whether inorganic bromide, methyl bromide, or some other more complex organic bromide, is a problem yet to be studied. The analytical procedure used throughout this study determines the total bromides but does not differentiate between the various forms present.

SUMMARY AND CONCLUSIONS

A method of analyzing fruits and vegetables for total bromides following fumigation with methyl bromide has been developed. Results indicate that the amount of methyl bromide (determined as bromide) absorbed by the produce during fumigation is several times the normal bromide content. In most cases the fumigated material showed a drop in bromides after aeration. Dried fruits, fresh fruits, and vegetables absorbed minor quantities of the fumigant. The foodstuffs which absorb greater amounts of the fumigant include milled grains, cheese, nuts, and nutmeats. The adsorptive capacity of milled grains is due primarily to their greater surface area, while the oily and fatty foods absorb large quantities of methyl bromide because of its solubility in fats.

Feeding experiments with rats show that when excessive (620 to 529 mg. Br/100 gm.) amounts of methyl bromide are present in the food, an increased death rate is produced, gain in weight and activity are reduced, and general health and reproductivity are adversely affected. When rat food containing moderate amounts of bromides (following fumigation at 3 pounds of methyl bromide per 1,000 cubic feet for 24 hours) or when fumigated fruits and vegetables are fed, little or no deleterious effects were noted. Activity, general condition, gain in weight, and reproductivity were normal.

The minimum lethal dose of methyl bromide for rabbits by ingestion is estimated at 60–65 mg. of methyl bromide per kilogram of body weight.

When rabbits were fed on a diet containing excessive amounts of methyl bromide (362 to 256 mg. Br/100 gm.), all animals died in 2

weeks, exhibiting symptoms of progressive paralysis. In prolonged rabbit feeding experiments (52 weeks' duration), the animals were fed on food fumigated at a concentration of 3 pounds of methyl bromide per 1,000 cubic feet (9.36 to 5.55 mg. Br/100 gm.). These rabbits showed little or no deleterious effects. Activity and general condition were normal, but weight increases were 10 to 12 percent below those shown by the controls.

Rabbits receiving 56 to 71 mg. of CH_3Br per kilo of body weight in olive oil by intubation showed destruction of superficial layers of stomach, duodenum, and, occasionally, the jejunum, with accompanying hemorrhage and hyperemia.

Rabbits fed a mixed diet containing a concentration of 3,865 p. p. m. of methyl bromide showed no changes in the gastrointestinal tract. All were paralyzed prior to death and all showed pulmonary damage. Congestion of cerebral capillaries or focal areas of perivascular lymphocytic infiltration in the cerebrum were found in some of the animals.

Rabbits fed a mixed diet immediately and 24 hours after fumigation with a concentration of 3 pounds of methyl bromide per 1,000 cubic feet showed no resulting pathological damage after 52 weeks' feeding.

Rats fed a stock diet containing 1,550 parts per million and examined at 1- or 2-week intervals for 16 weeks showed no histopathological damage that could be attributed to methyl bromide.

Rats fed pellets containing an average of 6,830 parts per million of methyl bromide for a period of 20 weeks showed nothing of note histopathologically.

Rats fed for 20 weeks with pellets used immediately and 24 hours after fumigation with a concentration of 3 pounds of methyl bromide per 1,000 cubic feet showed nothing of note. Rats fed vegetable diets similarly treated also presented negative pathological findings.

Definite pathological lesions produced in the stomach, duodenum, and jejunum of rabbits receiving high concentrations of methyl bromide in olive oil appear to be of the nature of an acute irritative reaction. The irritation may be caused by hydrolysis of the methyl bromide to hydrobromic acid and methanol, or by a delayed direct action of the methyl bromide because of its partial retention in the oil.

The pneumonia and bronchitis encountered in the rabbits receiving the mixed diet containing a very high concentration of methyl bromide might be attributed, at least to some extent, to inhalation of the methyl bromide retained in the feed, particularly the hay. It could also be considered as an indication of general physical debility, especially in view of the fact that gastrointestinal damage, even though slight, was found in some of these animals. That the rabbits of this group died following paralysis and that slight cerebral changes were found would also suggest that the pulmonary damage was of a secondary nature.

The absence of fat droplets in the cells of the adrenals and liver was conspicuous in the rats and rabbits examined in this study. While an appreciable quantity of fat in the liver of rats and rabbits is generally conceded to be abnormal, at least some is found in a series of animals of this number. Fat droplets in the cells of the adrenal cortex usually occur more frequently in a similar number of animals. No conclusions can be drawn from the data at hand as to the significance of this conspicuous negative finding.

It is also to be noted that the pathological changes, when present, were more marked in the rabbit than in the rat, pointing to the possibility of a species tolerance or resistance.

The lack of appreciable systemic pathological findings in the animals fed foodstuffs fumigated with 3 pounds of methyl bromide per 1,000 cubic feet is significant.

The diets fed to the animals in the tests herein described consisted entirely of fumigated foodstuffs, all of which contained more methyl bromide than is found in similar foodstuffs fumigated by methods approximating present commercial procedures. Thus it seems unlikely that the small amount of methyl bromide or bromide residues on commercially fumigated fresh vegetables and fruits, or dried fruits, is harmful to the consumer.

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REFERENCES

(1) United States Department of Agriculture, Bureau of Entomology and Plant Quarantine.
Lon A. Hawkins: Fumigation of dormant deciduous nursery stock with methyl bromide. October 1938. E. 458.
The use of methyl bromide for treatment of quarantined plant products. July 1939. E. 484.
Fumigation of vetch seed. September 1939. E. 492.
H. C. Donohoe and V. A. Johnson: The effect on plants of methyl bromide fumigation. June 1939. E. 482.
(2) Mackie, D. B.: Methyl bromide—its expectancy as a fumigant. J. Econ. Entomol., **31**: 70 (1938).
(3) Dudley, H. C.: Bromide content of fruits and vegetables following fumigation with methyl bromide. J. Ind. and Eng. Chem., Anal. Ed., **11**: 259 (1939).
(4) McLaine, L. S., and Munro, H. A. U.: Sixty-seventh Annual Report, Entomol. Soc. of Ontario, p. 15, 1936.
(5) Dow Chemical Company Trade Publication: Dow Methyl Bromide, second edition, 1938.
(6) Stenger, V. A., Shrader, S. A., and Beshgetoor, A. W.: Analytical methods for methyl bromide. J. Ind. and Eng. Chem., Anal. Ed., **11**: 121 (1939).
(7) Neufeld, A. H.: Contributions to the biochemistry of bromine I. Canad. J. Research, Sect. B., **14**: 160 (1936).
(8) Damiens, A., and Blaignan, S.: Normal bromine content of edible plants and fruits. Compt. rend. Acad. d. Sci., **194**: 2077 (1932).
(9) Lillie, R. D., and Pasternack, J. G.: Romanowsky staining with buffered solutions. II. Current modification. J. Tech. Methods, **15**: 65–70 (1936). Personal communications from author regarding recent modifications.
(10) Lillie, R. D.: Personal communications.
(11) Hanzlik, P. J., Talbot, E. P., and Gibson, E. E.: Continued administration of iodide and other salts. Arch. Int. Med., **42**: 579 (1928).

DISCUSSION OF THE HAZARDS ASSOCIATED WITH THE USE OF METHYL BROMIDE AS A FUMIGANT

In order to provide safe methods of application of methyl bromide as a fumigant, the Division of Industrial Hygiene of the National Institute of Health prepared and issued (May 1938) preliminary recommendations to fumigators for the use of methyl bromide (see below). These recommendations were of a preliminary character, based not only on experimental findings of studies of methyl bromide but also on experience with other toxic gases and particularly other fumigants. These preliminary recommendations were occasioned by one fatality and several cases of illness of a serious nature arising from inhalation of methyl bromide during or after commercial fumigation. The application of these precautionary measures during the past 2 years has apparently been helpful in preventing serious illness, since no new cases have been reported. The cooperation of the United States Department of Agriculture and the principal manufacturers of methyl bromide in insisting that safe methods be employed in the use of methyl bromide has resulted in the proper application of this fumigant.

Preliminary recommendations for use of methyl bromide as a fumigant

1. Avoid breathing air containing methyl bromide.
2. On completion of fumigation provide thorough ventilation for cars, rooms, or buildings before entering.
3. When necessary to enter spaces containing methyl bromide, use a gas mask provided with a canister giving protection against organic vapors, or a positive pressure hose mask. (Masks and canisters to be approved under United States Bureau of Mines Schedule 14D or 19A. Canisters, black, type B.)
4. Avoid spilling of methyl bromide. Get to fresh air immediately in case of spillage. Remove any clothing in contact with skin which has become impregnated with the liquid.
5. Post warning signs notifying that methyl bromide is being used and that the gas is toxic.
6. Containers of methyl bromide should be stored in a cool, well-ventilated place, outside inhabited buildings. Avoid leakage by seeing that valves on cylinders are tightly closed.

The maximum concentration now used in commercial fumigation procedures is about 2½ pounds of methyl bromide per 1,000 cubic feet (40 mg./l. or 0.95 percent by volume), with concentrations ranging as

low as 1 pound of methyl bromide per 1,000 cubic feet of space to be fumigated. Experimental studies with animals by Sayers et al. (1929) have indicated that a concentration of methyl bromide of 0.2 to 0.4 percent by volume is dangerous for a 30–60 minute exposure, while as little as 0.005 percent by volume has produced slight symptoms in animals after prolonged exposure. Recent work by Irish et al. (1940) has shown that repeated exposure of experimental animals to low concentrations of methyl bromide causes the development of paralysis, which may terminate in death. Their findings indicate that rabbits exposed 6 hours per day for 6 months to a concentration of 0.13 mg. of methyl bromide per liter (34 p. p. m.) develop paralysis. At higher concentrations both rabbits and monkeys develop paralysis and soon die if exposure is continued. If the exposures are discontinued immediately upon the development of paralysis the animals often return to normal, exhibiting little or no signs of residual effects.

The method now in common use to test for the presence of methyl bromide in workrooms is that of some type of halogen lamp or halide leak detector. Findings in this laboratory, under ideal conditions of light and in the absence of air currents, show that the lower limit of this type lamp is about 50 p. p. m. of methyl bromide. At 50 p. p. m. a moderately strong positive test is seen. However, at 35 p. p. m. an unreliable test is given. Lower concentrations give a negative test. Thus it will be seen that as a test for dangerous concentrations of methyl bromide, especially where exposure is prolonged and repeated, the halogen test lamp leads to a false sense of security and it is recommended that some more sensitive method be used, preferably some type of quantitative chemical procedure.

In man, symptoms caused by slight exposure to methyl bromide, as reported in the literature, include weakness, vertigo, and dyspnea. Often symptoms appear several hours after inhalation of the gas. In more severe exposures there may also appear psychic disturbances, attacks of mania, and transitory brachial paralysis. Double vision, amblyopia, and aphasia are likewise noted in certain nonfatal cases. Several fatal poisonings as the result of inhalation of methyl bromide while filling fire extinguishers in France are reported in detail. (See selected bibliography which follows.) In the United States two fatalities and several less severe cases resulting from exposures during fumigation have been reported.

The toxicity of methyl bromide when used as a fumigant has unfortunately been underestimated in some quarters, owing to ignorance of its toxicity as well as its lack of odor at the lower concentrations and the fact that it possesses no irritant properties. Although methyl bromide is less toxic to man than certain other fumigants in common use in the United States, careless handling and inadequate protective measures will unduly expose fumigators and other persons coming in

contact with the fumigant. It is recommended that the precautionary measures that have been issued by the United States Public Health Service be adhered to closely. Copies of these recommendations will be furnished on request.

SELECTED BIBLIOGRAPHY ON METHYL BROMIDE

General

Merril, N. F.: Ueber Brommethyl und Brommethylhydrat. J. Prakt. Chem., 18: 293-298 (1878). Cf. Chem. Centralbl., 50: 34-35 (1879).
Methyl Bromide. Trans. Brit. Chem. Soc., pp. 454-5 (1884).
Thorpe, T. E.: Dictionary of Applied Chemistry. (First edition) p. 574 (1889). Revised and enlarged edition, p. 481 (1918). Longmans, Green and Co., London.
Jones, G. W.: The flammability of refrigerants. J. Ind. Eng. Chem., 20: 367-370 (1928).
(Flammable limits in air of methyl bromide, percent by volume. Lower, 13.5 percent; upper, 14.5 percent.)
Olson, J. C., and Graddis, A. H.: Flammable limits of methane depressed by methyl bromide. J. Ind. and Eng. Chem., 30: 308-311 (1938).
Moelwyn-Hughes, E. A.: Hydrolysis of the methyl halides. Proc. Roy. Soc. (Lond.), A164: 295-306 (1938).
Egan, C. J., and Kemp, J. D.: Methyl bromide. The heat capacity, vapor pressure, heats of transition, fusion and vaporization. Entropy and density of the gas. J. Am. Chem. Soc., 60: 2097-2101 (1938).

Fumigation

Le Goupil, M.: Les propriétés insecticides du bromure de méthyle. Rev. path. veg. et ent. agr. de France, 19:169-172 (1932).
Storer, T. I.: Control of injurious rodents in California. University of Calif., Agric. Extension Service, Circular 79 (1933).
Vayssière, P.: Les stations de désinfection des végétaux sous vide partiel. Bull. Soc. Enc. Ind. Nat., 133:295-308 (1934).
Francolini, J. De: L'emploi du bromure de méthyle pour le traitement des graines de semence. Rev. path. veg. et ent. agr. de France, 22:3-8 (1935).
(Finds that in an atmosphere saturated with water vapor methyl bromide slowly forms HBr, so that during usual fumigations little hydrolysis occurs.)
Francolini, J. De: Action sur les produits végétaux du bromure de méthyle en fumigation sous vide partiel. Rev. path. veg. et ent. agr. de France, 22:9-12 (1935).
Lindgren, D. L.: Methyl bromide fumigation of codling moth larvae. J. Econ. Entomol., 29:1174-5 (1936). Correction: Methyl bromide fumigation etc., Ibid., 30:381 (1937).
McLaine, L. S., and Munro, H. A. U.: Developments in vacuum fumigation at the port of Montreal. Sixty-seventh annual report of the Entomol. Soc. of Ontario, pp. 15-17 (1936).
Lepigre, A.: Contribution a l'étude de la désinsectisation des grains par le mélange d'oxyde d'éthylène et d'acide carbonique. Notes sur le bromure de méthyle. Bull. Soc. Enc. Ind. Nat., 135: 385-462 (1936).
Shepard, H. H., et al.: The relative toxicity of insect fumigants. University of Minnesota, Agric. Exptl. Sta., Tech. Bull. 120 (1936).
Mackie, D. B., and Carter, W. B.: Methyl bromide as fumigant. A preliminary report. State of Calif., Dept. of Agric. Bull., 26:153-62 (1937).
Mackie, D. B.: Methyl bromide—its expectancy as a fumigant. J. Econ. Entomol., 31: 70-79 (1938).
(Gives report of 2 cases of exposure to methyl bromide during fumigation, 1 fatal.)
Fisk, F. W., and Shepard, H. H.: Laboratory studies of methyl bromide as an insect fumigant. J. Econ. Entomol., 31: 79-84 (1938).
Jones, R. M.: Toxicity of fumigant-CO_2 mixtures to the red flour beetle. J. Econ. Entomol., 31: 298-309 (1938).
Piper, W. R., Jr., and Davidson, R. H.: Methyl bromide vapor against five species of stored product insects. J. Econ. Entomol., 31:460-461 (1938).

Lepesme, P.: Recherches sur l'efficacité du bromure de méthyle dans la désinsectisation des denrées végétales sous vide partiel. Compt. rend. Acad. Agr. France, 24: 783–787 (1938).
Phillips, W. R., et al.: Some observations on the fumigation of apples with methyl bromide. Scientific Agric., 19: 7–20 (1938).
Stewart, M. A., and Mackie, D. B.: The control of sylvatic plague vectors. Am. J. Hyg., 28: 469–480 (1938).
(Finds that methyl bromide is very efficient in killing rodents and fleas.)
Berry, C. E.: Methyl bromide as a rodenticide. State of Calif., Dept. of Agric. Bull., 27: 172–180 (1938).
Preliminary recommendations to fumigators using methyl bromide or mixtures containing methyl bromide as a fumigant. Division of Industrial Hygiene, National Institute of Health, United States Public Health Service (1938)
Dow Methyl Bromide. Second edition (trade publication). Dow Chemical Co., Midland, Mich. (1938).
(Gives recommendations for safe handling)
Hawkins, L. A.: Fumigation of dormant deciduous nursery stock for the oriental fruit moth with methyl bromide. Bureau of Entomol. and Plant Quar., U. S. Dept. Agriculture, E–458 (October 1938).
Dudley, H. C.: Bromide content of fruits and vegetables following fumigation with methyl bromide. J. Ind. and Eng. Chem., Anal. Ed., 11: 259–261 (1939).
Dudley, H. C., Neal, P. A., and Sayers, R. R.: Bromide content of certain foodstuffs fumigated with methyl bromide. Natl. Research Council. Pacific Coast Meetings (1939) (In press).
Donohoe, H. C., and Johnson, V. A.: The effect on plants of methyl bromide fumigation in Japanese beetle treatment tests; preliminary report. Bureau of Entomol and Plant Quar., U. S. Dept. Agriculture, E–482 (June 1939).
Hawkins, L. A.: The use of methyl bromide for the treatment of quarantined plant products. Bureau of Entomol. and Plant Quar., U. S. Dept. Agriculture, E–484 (July 1939).
Hawkins L. A.: Fumigation of vetch seed to control the vetch bruchid. Bureau of Entomol. and Plant Quar., U. S. Dept. Agriculture, E–492 (September 1939).

Toxicology

Richardson, B. W.: Some further additions to therapeutics. I. Organic bromides. Practitioner, 6: 337–345 (1871).
(Methyl bromide as a general anaesthetic.)
Richardson, B. W.: Methyl-bromide. Asclepiad (Lond.), 8: 239–240 (1891).
(Use of methyl bromide as an anesthetic caused death in several cases. Methyl bromide is more toxic than ethyl bromide, chloroform, and ether.)
Schuler, M.: Vergiftung durch Brommethyl? Deutsch. Vierteljahrschr. f. offentl. Gesundheitspflege, 31: 696–704 (1899).
(Three cases, 1 fatal. All cases exhibited marked nervous symptoms. Experimented with rats, mice, and guinea pigs, in fatal dosages. Noted somnolence, running of nose, slowing of pulse, and cyanosis in animals.)
Jaquet, A.: Über Brommethylvergiftung. Deutsch. Arch. f. klin. Med., 71: 370–386 (1901).
(Report of 2 nonfatal cases which exhibited the typical series of symptoms described by Floret (1915). Some residual neurasthenia was observed. Probable repeated exposures.)
Bing, D.: Schweiz. Rundschau für Medizin, p. 1167 (1910). Quoted by: Rohrer: Vierteljahrschr. f. gericht. Med., 60: 54 (1920), and by Floret (1915).
(Reports 2 nonfatal cases in which residual symptoms continued for 6 and 7 months. The symptoms include tremor, dizziness, vomiting, and muscular debility with some transitory psychic changes.)
Floret: Klinischer Beitrag zur gewerblichen Brommethylvergiftung. Zentralblatt fur Gewerbehyg., 3: 146–149 (1915).
(Reports 3 nonfatal cases. Recovery in 4 to 6 weeks. The illness shows three stages:
1. Dizziness, vertigo, progressive paralysis, disturbed vision.
2. Delirium, hallucinations, convulsions, coma.
3. Hypochondric-hystero-neurasthenia which may last for years.)
Steiger, O.: Über Brommethylvergiftung. Münch. med. Wchnschr., 65: 753–755 (1918).
(Reports 1 nonfatal case. Symptoms similar to above. Blood appeared to contain methemoglobin. Eight weeks after exposure patient showed intestinal disturbances.)

Goldschmid, E., and Kuhn, E.: Brommethylvergiftung mit tödlichem Ausgang. Zentralbl. f. Gewerbehyg., 8: 28–36 (1920).
(Reports 9 cases, including 3 fatal ones. In the fatal cases, autopsy showed extensive changes in the ganglion cells of the cerebral cortex. Findings also included purulent bronchitis and inflammatory edema of the lungs.)
Löffler, W., and Rütimeyer, W.: Über Vergiftung mit Brommethyl und Nachweis der Substanz in Blut und Organen vergifteter Tiere. Vierteljahr. ger. Med., **60**: 60–67 (1920).
(Reports 1 fatal case. Authors suggest that there may be a subacute or chronic phase in this instance.)
Rohrer, F.: Ein Beitrag zur Frage der Spätwirkungen von Giftstoffen. Über Brommethylvergiftung. Vierteljahr. ger. Med., **60**: 51–59 (1920).
(Report of 1 fatal case which exhibited a latent period, followed by epileptiform seizures, coma, and death.)
Cadé, A., and Mazel, P.: Intoxication par le bromure de méthyle. Bull. et mém. Soc. Méd. d. Hôp. de Paris, (3S.) **47**: 722–727 (1922).
(Report of 2 nonfatal cases. One case of more severe exposure showed symptoms 2 hours following exposure. Showed incoordination of eye muscles, aphasia, with muscular fatigue persisting for 7 weeks or longer.)
Adler-Herzmark, J.: Eine tödliche Brommethylvergiftung. Zentr. f. Gewerbehyg. u. Unfallverh. (N. F.), **4**: 161 (1927).
(Report of 1 fatal case showing typical picture of rather severe exposure with latent period of 16 hours.)
Bachem, C.: Beitrag zur Toxikologie der Halogenalkyle. Arch. exptl. Pathol. u. Pharmacol., **122**: 69–76 (1927).
(Experimental studies of toxicity of methyl bromide for mice, on inhalation. The concentration 0.75 mg. of methyl bromide per liter was just tolerated by the mice for a single exposure.)
Gronow, W. Elsner von: Die Anwendung chemischer Sonder-Nassfeuerlöscher in den gewerblichen Betrieben unter dem Gesichtspunkte ihrer Einwirkung auf die Benutzer. Zentr. f. Gewerbehyg. u. Unfallverh., (N. F.) **4**: 161–6 (1927).
See also: Stahl, cited below.
(Recommends use of methyl bromide as a fire extinguisher fluid because of relatively slight danger to health of user.)
Henderson, Y., and Haggard, H. W.: Noxious gases and the principles of respiration influencing their action. A. C. S. Monograph Series No. 35 (1927).
(Believes that toxic action of methyl bromide is due to hydrolysis to methyl alcohol. States that severe methanol poisoning may result from prolonged exposure.
NOTE: See work of Irish et al. (1940) which indicates that methyl bromide is more toxic than methyl alcohol.)
Flury, F., and Zangger, H.: Lehrbuch der Toxikologie für Studium und Praxis, p. 206. Verlag von Julius Springer, Berlin, 1928.
(A short review. Describes free interval before onset of symptoms in acute exposures.)
Glaser, E.: Zur Kenntnis der gewerblichen Brommethylvergiftungen. Deutsch. Z. Ges. ger. Med., **12**: 470–474 (1928).
(Report of 1 fatal case. Indicates a symptomless interval after exposure before onset of symptoms. In this rather severe exposure the patient lost consciousness some time after exposure and died within several hours without regaining consciousness. Produced paralysis in guinea pigs on repeated exposure.)
Meixner, K.: Vergiftung durch Dämpfe des Feuerlöschmittels Polein (Methylbromid). Beitr. z. ger. Med., **8**: 10–17 (1928).
(Reports on fatal case of methyl bromide poisoning while filling fire extinguishers. Epileptiform convulsions and marked cyanosis before death. Autopsy showed diffuse lung edema and first stages of brain edema.)
Merzbach, L.: Zur Pharmakologie des Brommethyls und einiger seiner Verwandten. Z. Ges. exper. Med., **63**: 383–392 (1928).
(Studied the toxicological and narcotic properties of methyl and ethyl bromide and chlorides. Dogs are killed by a concentration of 8.5 mg. methyl bromide per liter, which produced fatal lung edema. Dogs survived exposure to 3.4 mg. per liter. Higher concentrations produced death by asphyxia.)
Stahl, H.: Die Anwendung chemischer Sonder-Nassfeuerlöscher in den gewerblichen Betrieben unter de Gesichtspunkte ihrer Einwirkung auf die Benutzer. Zentr. f. Gewerbehyg. u. Unfallverh., (N. F.) **5**: 78–80 (1928).
See also: Von Gronow, cited above.

(Takes issue with Von Gronow and believes there is appreciable risk when using methyl bromide as a fire extinguisher fluid.)

Glaser, E., and Frisch, S.: Ein Beitrag zur Kenntnis der Wirkung technisch und hygienisch wichtiger Gase und Dampfe auf den Organismus. Über gebromte Kohlwasserstoffe der Fettreihe. Arch. fur Hyg., **101**: 48–64 (1929).
(Experimental studies of the toxicity of several halogenated hydrocarbons using mice, rats, and guinea pigs. Methyl bromide produced more toxic effects than C_2H_5Br, $C_2H_4Br_2$, or $C_2H_2Br_4$.)

Sayers, R. R., et al.: Physiological response attending exposure to vapors of methyl bromide, methyl chloride, ethyl bromide, and ethyl chloride. Public Health Bull. No. 185. U. S. Government Printing Office (1929).
(Guinea pigs were exposed to methyl bromide. Short exposure to high concentration produced loss of equilibrium, struggling, and often anesthesia. Animals not dying recovered rapidly. In longer exposures similar symptoms were noted with death in from 1 to 4 days, apparently due to lung edema. Methyl bromide was the most toxic of the materials tested.)

Feil, A.: Intoxication professionnelle par le bromure de méthyle. Semaine d. hôp. de Paris, **6**: 599–601 (1930).
(A review of medical and legal aspects. Gives industries endangered by methyl bromide.)

Joachimoglu, G.: Toxikologische Betrachtungen über einige moderne Feuerloschmittel. Deut. med. Wchnschr., **56**: 785–787 (1930).
(Methyl bromide much more toxic than CCl_4. Exposure of dogs produced lung edema, dyspnoea, and finally death.)

Petri, Else: Pathologische Anatomie und Histologie der Vergiftungen. Pp. 272–273. Volume 10 of Handbuch der Speziellen Pathologischen Anatomie und Histologie, issued by F. Henke and O. Lubarsch. Verlag von Julius Springer, Berlin, 1930.
(Reviews symptoms and pathology of methyl bromide intoxication from various sources.)

Flury, F., and Zernik, F.: Schädliche Gase, Dämpfe, Nebel, Rauch- und Staubarten. Pp. 309–310 and others. Verlag von Julius Springer, Berlin, 1931.
(Suggests action as a nerve poison is due to formation of methyl alcohol. A review of symptomatology. Therapy is purely symptomatic.)

Henning, A.: Application of the halogen derivatives of the hydrocarbons with particular reference to methyl bromide. Chem. and Indust., **52**: 462–464 (1933).
(Describes and recommends use of methyl bromide in fire extinguishers. Unfortunately the author minimizes the toxic properties of methyl bromide.)

Nuckols, A. H., et al.: Comparative life, fire, and explosion hazards of common refrigerants. Underwrit. Labs. Misc. Hazards, No. 2375 (1933).
(Experimentally determined the toxic effects of exposing guinea pigs for periods of 5 minutes to 2 hours at concentrations of 0.5 to 2.5 percent by volume. Experiments on explosibility and flame propagation.)

Oppermann, K.: Berufliche Brommethylvergiftung. Sammlung von Vergiftungsfällen, **4**: Abt. A, 157–160 (1933).
(Reports 2 nonfatal cases with long symptom-free interval. Brain irritation of long duration was noted in one case and psychic debility in the other.)
See also Friemann (1937).

Tietze, A.: Klinische Beobachtungen zur Methylbromid- und Tetrachlorkohlenstoff-Vergiftung. Arch. f. Gewerbepath. u. Gewerbehyg., 4:733–739 (1933).
(Describes 2 nonfatal cases of apparent chronic exposure for 3 and 6 months. Both exhibited epilepsy, with central and peripheral nervous disturbances. Recovery took place in 2 to 3 months.)

Beyne, J., and Goett, M.: Toxicité de certains appareils extincteurs d'incendie et précautions qu'ils comportent dans leur emploi. Arch. de méd. et pharm. nav., 124:409–427 (1934).
(Review of toxicology. Experiment with rabbits and dogs at concentration of 6 to 36 mg./l. for 25 to 35 minutes. Acute exposure caused lung edema and congestion.)

International Labour Office: Occupation and Health, Vol. 2, pp, 238-240. Geneva, 1934.
(An excellent review. Toxic dose for man is small. Nerve action is due to rapid fixation of bromide in lipoids, which facilitates diffusion in the nerve cells. Is a central nervous system poison. Predisposition is variable. Persons of lymphatic type and those of nervous disposition show little resistance.)

Kohn-Abrest, E.: Précis de toxicologie. P. 83. G. Doin et Cie., Paris, 1934.
(Estimates methyl bromide to be four times as toxic as carbon tetrachloride.)

Schwarz, F.: Brommethyl in der Schädlingsbekämpfung. Aerztliche Sachverstandigen-Zeitung, 42:258–9 (1936).
(States methyl bromide fumigation has no effect on taste or smell of foods except certain oils and fats. Believes methyl bromide to be extraordinarily stable, with little reaction with foodstuffs. Gives general discussion of toxicology and insecticidal value. Warns of dangers connected with use.)
Duvoir, M. et al: L'intoxication par le bromure de méthyle. Bull. et mém. Soc. Méd. d. hôp. de Paris, (3 S.) 53:1540–1554 (1937).
(Reports 6 cases, 2 fatal. Nonfatal cases exhibited amblyopia, ataxia, aphasia, and transitory paralysis. In some epileptiform crises were evidenced. Those which came to autopsy showed diffused acute congestion of the meninges and brain, and marked lung edema.)
Friemann, W.: Berufliche todliche Brommethyl-Vergiftung. Sammlung von Vergiftungsfallen, 8: Abt. A, 31–32 (1937).
(Reports repeated epileptiform seizures for 2 years, in case reported by K. Opperman (1933). Some nystagmus and feeling of discomfort 4 years following exposure. Reports 2 newer cases, 1 fatal. Assumes that the fatal case was due in part to repeated previous exposures, since both men were exposed at the same time.)
Oettingen, W. F. von: The halogenated hydrocarbons: Their toxicity and potential dangers. J. Ind. Hyg. and Toxicol., 19:349–448 (1937).
(A review: Believes that methyl bromide is not as harmless as anticipated by Von Gronow (1917).)
Gueffroy, W., and Ehrhardt, W.: Die Halogenkohlwasserstoffe der Fettreihe als Lösungsmittel in ihrer Bedeutung fur die ärztliche Praxis. Zentr. f. Gewerbehyg. u. Unfallverh., (N. F.) 15: 224–230 (1938).
(Gives properties and preparation of methyl bromide, with sources of intoxication and a general review of literature on toxicology. Classes CH_3Br and other halogenated hydrocarbons as active toxic agents for which no specific medical prophylaxis for chronic poisoning is known.)
Duvoir, M., et al.: L'intoxication par le bromure de méthyle. Bull. sci. pharmacol., 46: 15 (1939).
(Experimental studies show much bromine in lipid rich tissues. The pathological picture is of a vasomotor crisis. Adrenaline was without effect.)
Dérobert, L.: L'intoxication professionelle par le bromure de méthyle. Gaz. méd. de Strasbourg, 99: 179–184 (1939).
(A review giving sources of intoxication and literature on toxicology of methyl bromide.)
Howcroft, J. R.: Modern fire fighting: Chem. and Indust., p. 323 (1939).
(Points out that fumes of CH_3Br and its decomposition products are toxic. Warns of dangers to firemen from use of CH_3Br as an extinguisher fluid.)
Irish, D. D., et al.: The response attending exposure of laboratory animals to vapors of methyl bromide. J. Ind. Hyg. and Toxicol., 22: 218 (1940).
(Shows results of experimental studies of chronic toxicity of methyl bromide. Produced paralysis in monkeys and rabbits by repeated exposures. Paralysis may be transitory if exposure is terminated.)

HOME SANITATION *

Since the home is the center of all family life, every effort should be made to make it a healthful place to live, as well as attractive and comfortable.

A number of States have enacted housing laws designed to raise the sanitary standards of housing. Health departments are also realizing that home sanitation is important in the control of many diseases. Society has come to realize that it can no longer afford the consequences of poor housing and slum conditions.

*This material is available in leaflet form and a limited number of copies may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

SANITARY AND HYGIENIC REQUIREMENTS OF GOOD HOUSING

Water Supply.

A safe and adequate water supply is one of the primary requirements of healthful living. To be fully serviceable, it should be convenient for cleansing and bathing purposes, as well as safe for drinking. People living in large cities are usually amply protected. In rural areas, it is necessary to take extra precautions to safeguard the water supply since the danger of contamination from excreta and other sources is so much greater than in cities. The local health department should be consulted regarding the best methods of preventing pollution of the water supply.

The most serious of the water-borne diseases are diseases of the intestinal tract—typhoid fever, dysentery, and cholera. All are due to germs from the intestinal discharges of infected persons which obtain entrance into the drinking water. Digestive disturbances may also result from water which has been highly polluted with decaying organic matter.

Excreta Disposal.

Indoor toilets, in addition to being a convenience, are usually much more sanitary than outdoor toilets. They should be kept clean, and there should be adequate provision for light and fresh air in the room in which they are located. In areas where this convenience is not available, proper construction and proper screening are highly important to guard against the spread of diseases by contact and by flies and other insects.

Refuse Disposal.

The garbage pail should be made of metal. It should be watertight and should always be kept properly covered. Where garbage is allowed to accumulate or is strewn on the ground, flies and rats are attracted. The accumulation of rubbish also creates a fire hazard in addition to being unsightly.

Flies, Other Insects, and Rats.

Every effort should be made to keep flies out of the home by proper screening of all doors, windows, and other openings. It is much more effective to prevent their entrance into the house than to attempt to destroy them after they have gotten in.

The best method of combating flies is to eliminate their breeding places. Attention to manure piles and open privies and prompt removal of accumulations of cut grass, garbage, or other refuse are important. Stagnant water should not be permitted around a dwelling, particularly water that becomes stagnant in broken bottles or open cans.

Houses should be made ratproof. When rats gain entrance, steps to eliminate them should be taken immediately by trapping, poison bait, and other methods. All food should be stored in protected containers to prevent rats from gaining access to it.

The Cellar.

Dampness and low temperatures lower the normal resistance of individuals to colds and other respiratory infections. Cellars should be kept clean and frequently aired and sunned to prevent dampness. All leaky pipes should be located and immediately repaired. Objects stored should be neatly piled to prevent accidents.

Light and Fresh Air.

Sunshine and fresh air are highly destructive to germ life. Every room should have at least one window, and the window area in each room should be at least 15 percent of the floor area. In general, rooms should be 8 to 9 feet high. Not more than two persons should occupy a sleeping room at the same time. Bedroom overcrowding is particularly undesirable since it favors the spread of disease, does not permit restful sleep, and is not in accord with the requirements of decency.

Plumbing.

All drainage pipes should be kept open and free from obstruction. The toilet bowl should not be used for the disposal of garbage, since waste materials of this type readily clog the pipes. Insanitary conditions as well as a plumber's bill are the result.

It is important that all refuse be strained from wash waters before the sink is drained. Kitchen closets should be kept clean and not used as "catch-alls" to serve as a breeding place for vermin.

Accident Prevention.

The number of accidents that occur in the home and their seriousness are not ordinarily appreciated. Improvement in heating and cooking devices and adequate lighting are aiding greatly in reducing the number of accidents. The house should be kept clean and in good repair, to avoid the danger from falls.

ANYTHING WHICH TENDS TO FOSTER FAMILY LIFE, AND TO MAKE IT DELIGHTFUL, COMFORTABLE, AND HAPPY, MAKES FOR A STABLE, CONTENTED PEOPLE.

A PRELIMINARY SURVEY OF THE INDUSTRIAL HYGIENE PROBLEM IN THE UNITED STATES [1]

A REVIEW

Surveys were made in certain States during the period 1936–39, which covered such items as existing health services in industrial establishments, exposure to materials and conditions which might influence health, and an inventory of control measures in use.

The present study is an analysis of such surveys conducted in 15 States, covering 16,803 plants, employing 1,487,224 workers. It is felt that the sample is sufficiently adequate and representative of industrial conditions in this country to warrant considering the data applicable to all industrial establishments of the type studied in the United States.

With reference to safety provisions, it appears that only 25.6 percent of the workers had the services of a full-time safety director. Hospital facilities were found to be available to only 15 percent of the workers, and first-aid rooms were provided for 51 percent. Full-time services of a physician were available to 15.5 percent, while full-time nursing services were provided for 33.3 percent of the employees. The analysis revealed that although accident records were kept on nearly all workers, sickness statistics were available for only 45.4 percent of the employees. For practically all of the health services now considered desirable, the larger plants were found to have these more frequently than the smaller plants.

The analysis of exposures of workers to various materials and conditions of health significance showed that slightly more than 1,000,000 persons are exposed in this country to the inhalation of silica dust and one and one-half million persons to silicate dusts. Of the various exposures to metal dusts and fumes, the analysis indicates that approximately 800,000 persons are handling lead and its compounds, 34,000 are exposed to arsenic and its compounds, and nearly 33,000 were found to be handling mercury and its compounds. The highest exposure of all was in connection with the agents known to produce dermatitis.

An analysis of the control measures now available for the protection of workers against the exposures found in the survey shows that much still remains to be done in this country for the protection of workers against industrial health hazards. Examination of control measures for 1,503,204 exposures shows that 14.3 percent were provided with local exhaust ventilation, 3.2 percent with enclosed operations, 3.2 percent with respiratory protective devices, and, in the

[1] Public Health Bulletin No 259, same title as above. By J. J. Bloomfield, V. M. Trasko, R. R. Sayers, R. T. Page, and M. F. Peyton. Government Printing Office, Washington, 1940. Available from the Superintendent of Documents, Washington, D. C., at 20 cents per copy.

case of certain dusty trades, wet methods were employed in connection with 3.4 percent of the exposures.

From the analysis of the survey in the 15 States, certain conclusions and recommendations were possible. These deal primarily with the establishment of industrial hygiene programs in industry and in official agencies. A discussion on industrial hygiene administration is also presented in this bulletin.

COURT DECISION ON PUBLIC HEALTH

Village held liable on ground that sewage disposal plant constituted a nuisance.—(Wisconsin Supreme Court; *Hasslinger et al.* v. *Village of Hartland*, 290 N.W. 647; decided March 12, 1940.) The sewage disposal plant of the defendant village was located approximately 350 feet from the plaintiffs' house, and, in an action brought because of the odors from the plant, the Supreme Court of Wisconsin held that the plant constituted a nuisance and affirmed a judgment granting damages to the plaintiffs. "* * * where, as here," said the court, "it appears that defendant placed its plant so close to plaintiffs' dwelling as to bring it within the area in which odors from the plant normally, frequently, and regardless of unusual weather conditions produce an extreme degree of contamination of the air, the plant constitutes a nuisance by reason of its close proximity to plaintiffs' premises." The trial court had found that there appeared to be no changes in plan or operation by which the odors could be eliminated.

The village's plans and specifications for sewage disposal had been approved by the State board of health, and one of the claims of the village was that a sewage disposal plant which followed approved specifications could not be held a nuisance. But the appellate court said that, where the landowner's claim was that the plant was a nuisance not by reason of improper operation or planning but because of its location, the owner was not concluded by the orders or approval of the State board of health. The court further stated that, while plans included the location of the sewage disposal plant and the latter may have been within the scope of the board's approval, it was not within the competency of the board to foreclose a judicial determination whether by reason of location the plant would be a nuisance per se.

In answer to another contention that the village was discharging a governmental function and, therefore, immune, the supreme court said that the operation of the plant concededly constituted the exercise of a governmental function and that the village sustained no liability for negligence in the operation of this function but that it was not thereby exempted from liability for the maintenance of a nuisance.

DEATHS DURING WEEK ENDED NOVEMBER 23, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 23, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,070	8,002
Average for 3 prior years	7,913	
Total deaths, first 47 weeks of year	393,058	386,491
Deaths under 1 year of age	498	466
Average for 3 prior years	483	
Deaths under 1 year of age, first 47 weeks of year	23,589	23,315
Data from industrial insurance companies:		
Policies in force	64,819,724	66,543,128
Number of death claims	10,773	10,541
Death claims per 1,000 policies in force, annual rate	8.7	8.3
Death claims per 1,000 policies, first 47 weeks of year, annual rate	9.5	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED NOVEMBER 30, 1940

Summary

For the current week, increased incidence over the preceding week was recorded for diphtheria, influenza, measles, scarlet fever, smallpox, and whooping cough, while four of the communicable diseases reported weekly by the State health officers—influenza, measles, poliomyelitis, and whooping cough—were above the 5-year (1935–39) median.

The number of cases of influenza increased from 1,332 last week to 3,014 for the current week, with the largest numbers of cases and the greatest increases being recorded for California (from 471 to 1,490), Arizona (from 117 to 350), Texas (from 104 to 252), Oklahoma (from 38 to 118), and South Carolina (from 157 to 290). An official report from California dated December 3 indicated an unusual prevalence of a mild acute upper respiratory infection in the State, which is reported in the press as influenza. The highest incidence of influenza for the current week is apparently in the South Atlantic, South Central, and Western States, with comparatively few cases reported for the Northeastern and North Central areas. Up to and including the current week (48 weeks), 182,210 cases of influenza have been reported in the United States this year—a larger number than reported in any of the 5 preceding years with the exception of 1937. In none of the preceding years, however, was the occurrence of influenza of major epidemic proportions.

For the current week the Bureau of the Census reports 8,341 deaths in 88 major cities of the United States, as compared with 8,074 for the preceding week and with a 3-year (1937–39) average of 8,716 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended November 30, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	Nov. 30, 1940	Dec. 2, 1939		Nov. 30, 1940	Dec. 2, 1939		Nov. 30, 1940	Dec. 2, 1939		Nov. 30, 1940	Dec. 2, 1939	
NEW ENG.												
Maine	0	2	2	3	3	3	125	38	38	0	0	0
New Hampshire	0	1	1	-------	-------	-------	0	3	2	0	0	0
Vermont	0	0	0	-------	-------	-------	19	44	35	0	0	0
Massachusetts	4	11	7	-------	-------	-------	226	225	158	1	1	1
Rhode Island	1	0	0	-------	-------	-------	0	79	14	0	0	0
Connecticut	0	2	3	2	2	6	1	33	33	1	0	0
MID. ATL.												
New York	10	22	28	[1]2	[1]4	[1]11	644	373	373	2	1	6
New Jersey	11	19	19	4	13	13	258	12	21	0	3	2
Pennsylvania	11	37	36	-------	-------	-------	746	61	48	2	5	3
E. NO. CEN.												
Ohio	11	47	47	25	62	28	65	45	45	1	1	1
Indiana	21	25	26	4	13	32	19	7	12	1	1	1
Illinois	42	45	45	5	15	15	510	22	22	3	0	3
Michigan [2]	13	10	30	12	4	2	523	133	133	0	0	2
Wisconsin	0	2	3	35	11	34	291	45	57	0	1	1
W. NO. CEN.												
Minnesota	1	4	7	-------	3	1	75	61	49	0	0	1
Iowa	6	4	6	-------	1	1	20	37	8	0	1	1
Missouri	4	15	28	1	-------	48	12	9	9	0	0	1
North Dakota	2	0	1	13	16	16	0	1	2	0	0	0
South Dakota	3	1	1	-------	1	-------	1	3	3	0	0	0
Nebraska	0	4	4	-------	-------	-------	0	1	1	0	1	0
Kansas	3	14	11	5	9	9	21	77	9	0	0	0
SO. ATL.												
Delaware	0	0	1	-------	-------	-------	5	3	3	0	0	0
Maryland [3]	6	11	13	3	3	4	2	5	15	0	0	3
Dist. of Col.	0	1	6	1	1	1	1	2	2	0	0	[illegible]
Virginia [3]	32	38	49	107	145	-------	20	18	13	1	0	3
West Virginia [3]	3	15	29	7	3	20	3	2	6	1	1	2
North Carolina [3]	30	63	64	10	6	6	25	136	136	1	1	2
South Carolina [3]	9	33	20	290	1,180	293	26	1	7	0	3	3
Georgia [3]	9	24	22	24	182	19	7	10	-------	1	0	1
Florida [3]	5	4	9	11	6	6	1	2	2	0	0	0
E. SO. CEN.												
Kentucky	14	16	16	18	12	16	145	6	31	0	2	2
Tennessee [3]	11	13	27	26	44	44	11	15	11	1	0	2
Alabama [3]	23	29	34	25	175	104	81	11	11	2	1	2
Mississippi [3]	6	11	12	-------	-------	-------	-------	-------	-------	0	1	0
W. SO. CEN.												
Arkansas	11	16	16	43	59	59	9	12	7	0	0	0
Louisiana [3]	19	17	17	3	3	11	0	1	3	0	0	0
Oklahoma	19	31	21	118	54	87	0	1	7	1	0	0
Texas [3]	28	62	62	252	359	268	24	17	17	0	1	2
MOUNTAIN												
Montana	2	1	1	19	88	4	4	9	10	0	0	1
Idaho	0	2	2	-------	1	1	0	9	49	0	0	0
Wyoming	0	1	0	4	13	-------	2	8	2	0	0	0
Colorado	6	10	10	5	53	-------	60	41	10	0	0	1
New Mexico	0	2	3	3	2	2	21	0	3	0	1	0
Arizona	6	4	6	350	65	65	29	1	1	0	0	0
Utah [2]	0	0	0	9	104	-------	2	127	3	0	0	0
Nevada	0	-------	-------				0	-------	-------	0	-------	-------
PACIFIC												
Washington	2	3	3	4	-------	-------	11	470	52	0	0	2
Oregon	3	7	1	81	24	24	19	28	11	0	1	1
California [2]	29	39	44	1,490	17	27	51	160	127	1	1	2
Total	416	718	852	3,014	2,756	1,510	4,065	2,399	2,399	20	28	75
48 weeks	14,346	21,731	25,748	182,210	165,468	149,838	252,893	363,819	363,819	1,493	1,821	5,073

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 30, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39	Week ended—		Median, 1935–39
	Nov. 30, 1940	Dec. 2, 1939		Nov. 30, 1940	Dec. 2, 1939		Nov. 30, 1940	Dec. 2, 1939		Nov. 30, 1940	Dec. 2, 1939	
NEW ENG.												
Maine	0	0	0	2	12	18	0	0	0	0	0	1
New Hampshire	0	0	0	5	4	14	0	0	0	0	0	0
Vermont	0	0	0	9	4	9	0	0	0	1	0	0
Massachusetts	0	2	1	124	76	144	0	0	0	1	0	1
Rhode Island	0	0	0	2	8	18	0	0	0	0	0	1
Connecticut	0	0	0	31	37	37	0	0	0	0	0	0
MID. ATL.												
New York	2	16	4	230	268	310	0	0	0	15	8	9
New Jersey	1	2	0	103	166	97	0	0	0	0	4	4
Pennsylvania	5	10	2	196	467	296	0	0	0	11	17	16
E. NO. CEN.												
Ohio	13	3	1	168	361	343	0	2	2	1	9	8
Indiana	9	1	0	93	153	160	0	4	5	2	1	1
Illinois	16	1	6	292	330	354	3	0	1	7	4	8
Michigan [2]	5	4	2	153	281	281	7	4	2	1	5	4
Wisconsin	17	3	0	154	151	162	3	0	5	0	0	0
W. NO. CEN.												
Minnesota	5	3	1	68	138	138	10	12	9	0	0	0
Iowa	6	10	1	65	86	86	0	6	6	1	1	1
Missouri	4	1	2	54	66	121	1	7	7	3	4	6
North Dakota	0	0	0	11	41	41	0	0	4	0	0	1
South Dakota	0	1	0	32	28	35	1	0	1	0	0	0
Nebraska	3	2	0	11	13	39	0	0	4	0	1	1
Kansas	6	0	0	68	100	139	0	0	1	1	1	2
SO. ATL.												
Delware	0	0	0	14	24	11	0	0	0	0	1	0
Maryland [3]	0	0	0	51	52	59	0	0	0	4	5	5
Dist. of Col.	1	0	0	19	16	14	0	0	0	0	1	0
Virginia [3]	4	1	1	66	54	47	0	0	0	4	8	7
West Virginia [3]	10	4	1	39	69	69	1	0	0	4	7	4
North Carolina [3]	0	0	1	84	101	62	0	0	0	1	1	3
South Carolina [3]	1	0	0	23	17	10	0	0	0	0	2	0
Georgia [3]	1	0	0	19	38	34	0	1	0	6	3	6
Florida [3]	2	0	0	7	5	7	0	0	0	1	5	0
E. SO. CEN.												
Kentucky	3	4	2	78	71	79	0	0	0	4	6	6
Tennessee [3]	2	1	1	58	64	61	0	0	0	4	2	4
Alabama [3]	0	2	2	30	39	27	0	0	0	5	1	2
Mississippi [2]	2	1	2	10	13	15	0	0	0	3	3	3
W. SO. CEN.												
Arkansas	0	1	1	20	17	17	5	0	0	4	7	4
Louisiana [3]	5	0	0	15	31	14	0	0	0	9	27	10
Oklahoma	0	0	0	38	24	42	0	0	2	4	4	8
Texas [3]	4	3	3	58	60	85	0	1	1	8	17	17
MOUNTAIN												
Montana	0	0	0	20	31	33	0	0	23	1	0	1
Idaho	0	7	1	19	12	23	0	0	1	0	1	3
Wyoming	0	1	0	9	9	8	0	0	0	0	1	0
Colorado	0	7	0	24	42	42	0	0	6	3	1	1
New Mexico	0	2	0	11	22	19	0	0	0	3	10	7
Arizona	0	0	0	2	4	6	1	0	0	0	0	1
Utah [2]	0	5	0	14	26	26	0	1	0	3	0	0
Nevada	0	------	------	1	------	------	0	------	------	0	------	------
PACIFIC												
Washington	1	0	2	35	58	50	0	1	5	2	0	4
Oregon	0	3	2	17	24	45	7	0	1	2	3	2
California [3]	2	15	9	140	180	217	1	0	6	2	11	11
Total	130	116	95	2,792	3,880	3,959	40	39	164	121	188	234
48 weeks	9,509	7,027	7,027	143,545	147,380	204,483	2,242	9,161	9,161	9,159	12,265	13,855

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended November 30, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough, week ended— Nov. 30, 1940	Whooping cough, week ended— Dec. 2, 1939
NEW ENG.		
Maine	24	49
New Hampshire	0	26
Vermont	19	71
Massachusetts	210	98
Rhode Island	8	14
Connecticut	91	68
MID. ATL.		
New York	562	416
New Jersey	187	157
Pennsylvania	503	439
E. NO. CEN.		
Ohio	271	246
Indiana	19	72
Illinois	220	164
Michigan [2]	308	161
Wisconsin	117	141
W. NO. CEN.		
Minnesota	130	49
Iowa	37	12
Missouri	51	9
North Dakota	32	33
South Dakota	0	7
Nebraska	29	4
Kansas	76	5
SO. ATL.		
Delaware	32	15
Maryland [2]	107	70
Dist. of Col.	10	19
Virginia [3]	133	35
West Virginia [2]	12	5
SO. ATL.—continued.		
North Carolina [3]	136	46
South Carolina [3]	24	14
Georgia [3]	22	9
Florida [3]	1	4
E. SO. CEN.		
Kentucky	122	89
Tennessee [3]	32	42
Alabama [3]	11	12
Mississippi [2]		
W. SO. CEN.		
Arkansas	15	9
Louisiana [3]	6	39
Oklahoma	17	5
Texas [3]	76	48
MOUNTAIN		
Montana	5	1
Idaho	3	0
Wyoming	1	13
Colorado	17	14
New Mexico	21	24
Arizona	9	3
Utah [2]	33	71
Nevada	0	
PACIFIC		
Washington	94	85
Oregon	15	24
California [3]	462	155
Total	4,310	3,042
48 weeks	155,280	102,828

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended November 30, 1940, 41 cases, as follows: Virginia, 2; North Carolina, 4; South Carolina 3; Georgia, 14; Florida, 1; Tennessee, 1; Alabama, 6; Louisiana, 3; Texas, 5; California, 2.

MONTHLY REPORTS FROM STATES

Case reports consolidated for the quarter July–September 1940

Division and State	Diphtheria	German measles	Influenza	Malaria	Measles	Meningitis, meningococcus	Ophthalmia neonatorum	Pellagra	Poliomyelitis	Puerperal septicemia	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Typhoid and paratyphoid fever	Typhus fever	Undulant fever	Whooping cough
NEW ENG.																	
Maine	9	11	3	--------	530	3	1	--------	8	--------	0	30	0	23	--------	6	367
New Hampshire	--------	--------	--------	--------	38	0	--------	--------	3	--------	0	20	0	3	--------	1	7
Vermont	3	14	--------	--------	74	2	--------	--------	2	--------	0	27	0	5	--------	10	170
Massachusetts	26	68	--------	1	3,544	7	--------	3	27	--------	0	404	0	72	--------	14	1,505
Rhode Island	--------	7	--------	--------	260	2	1	--------	10	--------	0	33	0	14	--------	1	40
Connecticut	2	34	12	--------	128	2	--------	--------	13	--------	0	132	0	34	--------	30	525
MID. ATL.																	
New York	87	319	--------	31	3,634	34	[1] 34	--------	137	--------	0	1,161	0	161	12	67	3,478
New Jersey	54	122	21	12	2,058	3	17	--------	29	--------	8	448	0	59	--------	24	1,249
Pennsylvania	94	131	--------	8	1,722	26	14	3	71	--------	6	971	0	209	--------	30	4,690
E. NO. CEN.																	
Ohio	67	38	105	39	232	6	--------	--------	355	1	3	784	1	144	--------	34	3,718
Indiana	70	--------	50	15	77	7	--------	--------	512	--------	7	221	5	61	--------	16	237
Illinois	147	48	47	89	920	13	10	1	293	--------	9	1,164	19	165	--------	51	1,760
Michigan	32	57	43	24	2,018	8	--------	--------	832	--------	0	794	7	59	--------	27	3,392
Wisconsin	12	--------	220	3	2,548	12	--------	--------	229	--------	0	612	13	5	--------	41	1,323
W. NO. CEN.																	
Minnesota	18	--------	23	8	146	3	--------	--------	98	--------	0	271	30	32	--------	43	497
Iowa	40	12	16	26	450	14	--------	--------	617	--------	18	213	34	35	--------	76	370
Missouri	41	--------	6	69	58	8	1	2	197	--------	6	166	4	158	--------	8	447
North Dakota	54	--------	22	--------	13	3	1	--------	15	--------	0	47	21	10	--------	4	161
South Dakota	18	--------	3	--------	26	0	--------	--------	57	--------	1	62	37	6	--------	--------	55
Nebraska	9	--------	--------	--------	75	7	--------	--------	97	--------	0	45	2	16	--------	1	75
Kansas	65	9	20	12	232	5	--------	1	410	--------	0	303	0	77	1	34	591
SO. ATL.																	
Delaware	2	--------	--------	--------	13	0	--------	--------	1	--------	3	21	0	14	--------	1	99
Maryland	27	8	21	5	48	5	--------	3	8	--------	37	116	0	51	1	7	1,387
Dist. of Col.	37	--------	--------	--------	18	2	--------	--------	1	--------	8	60	0	18	--------	2	95
Virginia	117	--------	548	59	384	12	--------	15	114	--------	31	150	0	125	3	9	728

West Virginia	57		84	6	45	17		2	440		1	205	0	110		2	626
North Carolina	199	15	17	370	238	6		31	41		15	372	2	138	27	3	1,333
South Carolina	267	21	1,433	4,476	97	0	10	410	6		0	51	2	183	36	7	251
Georgia	95		138	1,358	102	2		61	11	2	7	135	0	282	201	44	199
Florida	35	1	20	55	53	1		26	14		0	21	0	41	65	22	47
E. SO. CEN.																	
Kentucky	79	15	30	30	341	11		4	140		2	219	2	190		3	677
Tennessee	53	8	117	451	195	10	10	37	25	6	8	253	7	186	5	7	565
Alabama	110	3	250	6,526	463	20	4	112	27		0	190	6	150	120	32	239
Mississippi	85		3,008	21,230	331	4	23	1,214	16	101	0	97	4	131	18	13	1,979
W. SO. CEN.																	
Arkansas	64	9	86	1,864	91	1		107	13		0	72	0	349		3	257
Louisiana	62		38	250	21	8	3	18	79	([2])	0	51	0	298	44	20	489
Oklahoma	60		644	895	52	9		36	104		9	116	15	211	2	36	178
Texas	231		1,276	2,892	786	17	9	422	91		0	186	6	644	152	112	2,398
MOUNTAIN																	
Montana	22	7	23		145	7			88		4	113	1	7	1	2	75
Idaho	2	1	1	6	35	0			29		0	48	0	29		1	83
Wyoming	11	6	1	7	45	2			19		[3] 10	27	4	12		5	69
Colorado	75		32	3	100	0			17		3	117	24	36		17	174
New Mexico	29	15	7	7	127	2		2	17	4	1	16	1	53		15	268
Arizona	15	17	288	12	226	1		5	4		0	22	2	25		7	132
Utah	5	10	8	2	303	0			21		1	55	1	13		5	744
Nevada			1	1	4	0			1		1	2	0	6		1	13
PACIFIC																	
Washington	19	16	9		164	6			201		0	170	2	29		5	536
Oregon	32		50	13	249	3			37		2	74	9	29		3	210
California	181	229	171	84	968	13	13	15	217		1	692	5	123	6	76	3,782
Total	2,819	1,251	8,892	40,939	24,405	324	151	2,530	5,794	115	202	11,559	269	4,831	694	978	42,235
Alaska	9		9		128							3	1	5			
Hawaii	15	20	401	2	29	2			9			2		19	26		131

[1] Exclusive of New York City.
[2] Septicemia (undefined), Louisiana, 36.
[3] Also 1 case of Colorado tick fever was reported.

Case reports consolidated for the quarter July–September 1940—Continued

Division and State	Actinomycosis	Chickenpox	Dysentery, amoebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, epidemic or lethargic	Encephalitis, equine	Hookworm disease	Mumps	Rabies in animals	Rabies in man	Septic sore throat	Tetanus	Trachoma	Trichinosis	Tularemia	Vincents' infection
NEW ENG.																	
Maine	1	194							43	3		2	1				12
New Hampshire		22							6								26
Vermont		146							135								
Massachusetts	1	570	1	129		3			641	4		20	7	2	8		
Rhode Island		38				3			25	5		15					
Connecticut		311		60		1			152			39	4		8		
MID. ATL.																	
New York		1,992	20	160		28				38		205	15		42		129
New Jersey		727	6	4		9			1,184	75		18	1	1	5		
Pennsylvania		1,495	2	12		2			931						2	2	
E. NO. CEN.																	
Ohio		653		166		5			372		1	5	12	7	2		
Indiana		209		10		2			75	49	1	2	1			4	
Illinois	2	815	16	35		11		1	697	46	1	9	17	93	5	15	76
Michigan	1	658	5	13		5				3		157	4	1	5	1	36
Wisconsin		1,069				2			1,095			11				3	
W. NO. CEN.																	
Minnesota		347	7	9		5				4		32	6	7		7	
Iowa		80	4	2	4	9			216			9				12	
Missouri		44			44	2			56			7	2	76		15	
North Dakota		46				7			28			9		4			9
South Dakota		27							65			7		29			
Nebraska		27				5			42			1					
Kansas		107		4		18			81	1		15				6	47
SO. ATL.																	
Delaware		9				1			22								
Maryland		104	3	43	17				76			22	2	4		1	33
Dist. of Col		52				4										1	
Virginia		119	5	1,137		1			40			227	5			9	
West Virginia		78		3					52		2	8					
North Carolina		74		5								14		4			18
South Carolina		89	1					291	67	49	1		2			1	
Georgia		40	27	209	69			2,164	94			140	5	4		16	[illegible]

E. SO. CEN.																	
Kentucky		73		87		1			180			28		45		13	
Tennessee		51	9	242		4		7	186		1	39	3	10		14	21
Alabama		29	1			7			106	48			13				
Mississippi		317	589	4,974				2,348	479	14				19			
W. SO. CEN.																	
Arkansas		28	79	305				8	102	42	2	266	6	380	1	26	
Louisiana		12	11	4		1		402	1	18		8	10	11		3	
Oklahoma		221	6	456		1			34	43		99		309		13	26
Texas		235	140	1,546		6			347	1				15		11	
MOUNTAIN																	
Montana		92		27		30			54			16	1	4		7	5
Idaho		35	3	1					73					1		3	
Wyoming		15		1	10	3			14			9				47	7
Colorado		137	5	85		44			256			14				7	
New Mexico		28	5	50	44	2			17	19		10		1		2	
Arizona		32			288	1			154			1		137		3	
Utah		231	1		155				80			11				21	
Nevada		7	1				1		1			29		1		8	
PACIFIC																	
Washington		325	1	14		10	81		259	17		8	1	11		1	3
Oregon		135	13	1					145	20		10		1		3	22
California		1,273	51	118		135			1,496	59	1	8	17	29	13	3	
Total	5	13,441	1,024	9,918	631	370	82	6,795	10,194	559	10	1,544	140	1,187	91	280	486
Alaska		35										6					1
Hawaii		53	1					47	24				5	4			

[1] Exclusive of New York City.

Anthrax: Massachusetts, 4; New York, 1; New Jersey, 3; Pennsylvania, 6; Louisiana, 1; Texas, 1; Colorado, 1; Arizona, 1.
Botulism: Washington, 3; California, 4.
Colorado tick fever: Wyoming, 1.
Dengue: South Carolina, 9; Florida, 4; Mississippi, 3.
Diarrhea: Ohio, 731 (under 2 years; enteritis included); Michigan, 3 (infant diarrhea); Maryland, 51; South Carolina, 4,700; Nevada, 2 (infant diarrhea); New Mexico, 186 (enteritis included).

Food poisoning: Kansas, 3; New Mexico, 3; Washington, 7; California, 396.
Granuloma, coccidioidal: California, 12.
Leprosy: Hawaii Territory, 6; Illinois, 1; Louisiana, 7; Texas, 6; California, 2.
Plague, bubonic: Idaho, 1.
Psittacosis: New York, 1; California, 1.
Rat bite fever: Tennessee, 2.
Relapsing fever: Kansas, 1; Texas, 7; California, 18.
Weil's disease: Hawaii Territory, 2; Michigan, 2.

WEEKLY REPORTS FROM CITIES

City reports for week ended November 16, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	198	90	34	558	483	959	6	325	34	998	--------
Current week [1]	75	118	26	1,081	335	636	3	328	33	1,299	--------
Maine:											
Portland	0	------	0	0	3	2	0	0	0	4	36
New Hampshire:											
Concord	0	------	0	0	1	3	0	0	0	0	10
Manchester	0	------	0	0	0	0	0	0	0	0	15
Nashua	0	------	0	0	0	0	0	0	0	0	9
Vermont:											
Barre	------	------	------	------	------	------	------	------	------	------	------
Burlington	0	------	0	0	0	0	0	0	0	0	8
Rutland	0	------	0	0	0	0	0	0	0	0	2
Massachusetts:											
Boston	1	------	0	55	16	28	0	9	0	84	194
Fall River	1	------	0	0	0	2	0	1	0	14	34
Springfield	0	------	0	0	2	2	0	1	0	0	30
Worcester	1	------	0	72	2	1	0	1	0	0	37
Rhode Island:											
Pawtucket	0	------	0	0	0	0	0	0	0	0	19
Providence	0	------	0	2	2	2	0	0	1	2	61
Connecticut:											
Bridgeport	0	------	0	0	1	1	0	1	2	1	19
Hartford	0	------	0	0	2	3	0	0	0	3	45
New Haven	0	1	0	0	1	3	0	1	0	21	51
New York:											
Buffalo	0	------	0	3	7	4	0	5	0	29	134
New York	16	11	4	201	59	73	0	67	11	138	1,457
Rochester	0	1	0	2	0	3	0	1	0	19	49
Syracuse	0	------	0	0	2	1	0	0	0	14	47
New Jersey:											
Camden	0	------	0	14	0	3	0	1	0	2	34
Newark	0	2	0	7	3	15	0	5	0	19	111
Trenton	0	------	1	0	1	2	0	2	0	3	42
Pennsylvania:											
Philadelphia	2	1	0	221	18	41	0	21	2	140	478
Pittsburgh	1	1	0	5	15	15	0	4	5	37	158
Reading	1	------	0	4	3	1	0	0	0	32	25
Scranton	1	------	------	1	------	0	0	------	0	2	------
Ohio:											
Cincinnati	1	------	0	0	2	16	0	4	0	3	98
Cleveland	0	16	0	1	5	19	0	8	4	97	199
Columbus	0	------	0	0	3	14	0	2	1	21	86
Toledo	0	1	1	1	1	6	0	5	0	7	43
Indiana:											
Anderson	0	------	0	0	0	3	0	0	0	0	8
Fort Wayne	0	------	0	0	0	0	0	0	0	0	18
Indianapolis	4	------	0	1	3	11	0	3	0	8	113
Muncie	0	------	0	1	1	1	0	0	0	0	9
South Bend	0	------	0	0	1	1	0	0	0	0	19
Terre Haute	0	------	0	0	1	1	0	0	0	0	13
Illinois:											
Alton	0	------	0	0	3	0	0	0	0	1	16
Chicago	5	8	0	167	18	93	0	47	0	73	699
Elgin	0	------	0	0	0	0	0	0	0	0	8
Moline	0	------	0	0	0	0	0	0	0	0	11
Springfield	0	------	0	2	1	9	1	1	0	3	29
Michigan:											
Detroit	3	------	0	240	10	46	2	8	1	143	271
Flint	0	------	0	0	1	1	0	2	0	2	30
Grand Rapids	0	------	1	0	0	7	0	0	0	21	44
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	0	7
Madison	0	------	0	0	0	2	0	0	0	4	16
Milwaukee	0	------	0	20	4	18	0	2	0	81	88
Racine	0	------	0	1	0	1	0	0	0	1	9
Superior	0	------	0	0	0	2	0	0	0	0	10

[1] Figures for Barre and Boise estimated; reports not received.

City reports for week ended November 16, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0		0	0	1	2	0	0	0	4	12
Minneapolis	0		1	3	2	16	0	1	0	12	99
St. Paul	0		0	0	10	9	0	3	0	10	66
Iowa:											
Cedar Rapids	0			0		6	0		0	0	
Davenport	0			1		4	0		0	0	
Des Moines	0		0	0	0	7	0	0	0	4	27
Sioux City	0			0		8	0		0	0	
Waterloo	0			0		3	0		0	1	
Missouri:											
Kansas City	0		0	2	5	3	0	4	0	20	94
St. Joseph	0		0	0	3	3	0	1	0	1	20
St. Louis	0	3	1	2	11	21	0	6	1	28	189
North Dakota:											
Fargo	0		0	1	1	1	0	0	0	2	16
Grand Forks	0			1		0	0		0	0	
Minot	0		0	1	0	0	0	0	0	0	3
South Dakota:											
Aberdeen	0			0		1	0		0	2	
Sioux Falls	0		0	0	0	5	0	0	0	0	7
Nebraska:											
Omaha	0		0	1	3	4	0	2	0	0	48
Kansas:											
Lawrence	0		0	0	1	0	0	0	0	0	3
Topeka	0		0	0	4	6	0	0	0	1	19
Wichita	0		0	0	5	0	0	0	0	14	28
Delaware:											
Wilmington	0		0	0	1	2	0	0	0	12	23
Maryland:											
Baltimore	0	1	2	4	11	19	0	17	0	71	187
Cumberland	0		0	0	1	1	0	0	0	0	11
Frederick	0		0	0	0	0	0	0	0	0	1
Dist. of Col.:											
Washington	14	1	0	1	10	10	0	10	1	3	158
Virginia:											
Lynchburg	0		0	0	0	1	0	0	0	0	13
Norfolk	0		0	0	1	2	0	0	0	0	28
Richmond	0		1	0	1	4	0	1	0	0	41
Roanoke	1		0	7	1	1	0	0	0	2	18
West Virginia:											
Charleston	0	2	0	0	2	1	0	1	0	0	43
Huntington	1			0		0	0		0	0	
Wheeling	0		0	0	3	0	0	1	0	1	18
North Carolina:											
Gastonia	2			0		0	0		0	2	
Raleigh	1		0	0	1	2	0	0	0	3	13
Wilmington	1		0	0	0	2	0	0	0	1	9
Winston-Salem	2		0	1	2	1	0	2	0	25	18
South Carolina:											
Charleston	0	10	0	2	1	3	0	2	0	0	22
Florence	0	5	0	0	0	0	0	0	0	0	9
Greenville	0		0	2	2	2	0	0	0	0	12
Georgia:											
Atlanta	2	3	0	1	0	4	0	5	0	2	67
Brunswick	0		0	0	0	0	0	0	0	0	2
Savannah	0	14	1	0	1	0	0	2	0	0	35
Florida:											
Miami	0		0	0	1	0	0	1	0	0	33
Tampa	0		1	0	0	1	0	2	0	0	25
Kentucky:											
Ashland	0		0	0	1	1	0	1	0	0	7
Covington	1		0	2	4	1	0	2	0	2	14
Lexington	0		0	20	0	0	0	0	0	2	14
Louisville	0		0	0	5	12	0	0	0	1	49
Tennessee:											
Knoxville	1		0	0	2	1	0	1		2	
Memphis	0		1	5	2	6	0	3	0	3	73
Nashville	0		2	0	2	8	0	1	1	5	40
Alabama:											
Birmingham	0	8	1	10	5	3	0	2	0	2	61
Mobile	0	2	3	0	1	2	0	0	0	0	29
Montgomery	0			0		0	0		0	0	
Arkansas:											
Fort Smith	0			1		0	0		0	0	
Little Rock	0		0	0	1	1	0	1	0	0	

City reports for week ended November 16, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Louisiana:											
Lake Charles	1	------	0	0	0	1	0	0	0	0	5
New Orleans	3	8	1	1	16	1	0	10	0	4	160
Shreveport	0	------	0	0	0	0	0	1	0	0	42
Oklahoma:											
Oklahoma City	0	------	0	0	3	1	0	0	0	0	41
Tulsa	1	------	0	0	1	6	0	0	0	5	22
Texas:											
Dallas	2	------	0	0	4	5	0	1	1	2	63
Fort Worth	0	------	0	10	0	3	0	0	0	2	37
Galveston	0	------	0	0	3	0	0	0	0	0	15
Houston	4	------	1	0	4	6	0	2	1	0	78
San Antonio	0	2	1	0	5	0	0	8	0	5	57
Montana:											
Billings	0	------	0	0	1	1	0	0	0	0	7
Great Falls	0	------	0	2	3	1	0	1	0	0	14
Helena	0	------	0	0	0	1	0	0	0	0	3
Missoula	0	------	0	0	0	0	0	0	0	0	5
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Colorado Springs	0	------	0	0	2	6	0	0	0	0	7
Denver	2	------	2	9	4	6	0	5	1	11	89
Pueblo	0	------	0	0	1	3	0	0	0	0	7
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	1	0	0	9
Utah:											
Salt Lake City	0	------	0	1	4	6	0	0	0	16	36
Washington:											
Seattle	2	------	0	1	8	5	0	3	0	3	98
Spokane	0	------	0	0	0	1	0	1	0	0	28
Tacoma	0	------	0	2	1	5	0	1	0	6	39
Oregon:											
Portland	1	1	0	3	4	4	0	1	0	1	66
Salem	0	1	------	0	------	0	0	------	0	5	------
California:											
Los Angeles	2	38	1	5	4	13	0	22	0	36	302
Sacramento	3	------	0	2	0	7	0	4	0	0	45
San Francisco	0	------	0	0	4	2	0	5	0	29	166

State and city	Meningitis, meningococcus Cases	Meningitis, meningococcus Deaths	Poliomyelitis cases
New York:			
Buffalo	1	1	0
New York	0	0	1
Pennsylvania:			
Philadelphia	0	0	2
Ohio:			
Cincinnati	0	0	2
Cleveland	0	0	2
Columbus	0	0	1
Toledo	0	0	1
Illinois:			
Chicago	0	0	8
Elgin	0	0	1
Michigan:			
Detroit	2	0	2
Wisconsin:			
Madison	0	0	1
Minnesota:			
Minneapolis	0	0	1
Missouri:			
St. Joseph	1	0	0
St. Louis	0	0	1
Kansas:			
Wichita	0	0	1
Maryland:			
Baltimore	0	0	1
Virginia:			
Norfolk	0	0	1
West Virginia:			
Charleston	0	0	1
North Carolina:			
Raleigh	0	0	1
Florida:			
Miami	0	0	1
Tennessee:			
Knoxville	0	0	1
Louisiana:			
New Orleans	0	0	2
Shreveport	0	1	0
Colorado:			
Denver	0	0	1
Washington:			
Seattle	0	0	2
California:			
Los Angeles	0	0	1

Encephalitis, epidemic or lethargic.—Cases: Pittsburgh, 1; Topeka, 1.
Pellagra.—Cases: Charleston, S. C., 1; Montgomery, 1; Los Angeles, 2.
Typhus fever.—Cases: Raleigh, 1; Savannah, 1; Montgomery, 1; New Orleans, 1; Dallas, 1.

TERRITORIES AND POSSESSIONS

HAWAII

Influenza.—The mild epidemic of influenza in the Territory of Hawaii has apparently terminated. For the week ended November 22, 960 cases were reported, and for the week ended November 30 there were 449 cases.

Plague.—A rat found on October 25, 1940, in Paauhau Area, Hamakua District, Island of Hawaii, has been proved positive for plague.

274174°—40——4

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 2, 1940.—During the week ended November 2, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		3		2	8			2	2	17
Chickenpox		6	8	106	251	62	40	92	35	600
Diphtheria		38	6	51	1	7		3		106
Dysentery					2		1			3
Influenza		4			2	1			53	60
Measles		32	2	83	222	103	25	77	50	594
Mumps				21	51	28	1	11	9	121
Pneumonia		3			15				6	24
Poliomyelitis				1	3				1	5
Scarlet fever		16	6	122	100	8	8	19	28	307
Trachoma									5	5
Tuberculosis		1	3	58	33	5		2		102
Typhoid and paratyphoid fever			1	40	8	1	2		3	55
Whooping cough		3	9	290	111	35	11	27	5	491

NOTE.—No cases of the above diseases were reported from Prince Edward Island for this period.

GUATEMALA

Vital statistics—Year 1939.—Following are vital statistics for Guatemala for the year 1939:

Population, Apr. 7, 1940	3,284,269
Number of marriages	6,118
Number of marriages per 1,000 population	1.98
Number of births	104,809
Number of births per 1,000 population	33.99
Number of deaths	66,046
Number of deaths per 1,000 population	21.42
Deaths under 2 years of age	33,376

SWITZERLAND

Notifiable diseases—June 1940.—During the month of June 1940, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	44	Paratyphoid fever	16
Chickenpox	99	Poliomyelitis	5
Diphtheria and croup	22	Scarlet fever	328
German measles	78	Tuberculosis	272
Lethargic encephalitis	2	Typhoid fever	6
Measles	870	Undulant fever	12
Mumps	50	Whooping cough	164

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of November 29, 1940, pages 2246-2249. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Argentina—Cordoba Province.—During the month of October 1940, 3 cases of plague were reported in Cordoba Province, Argentina.

Yellow Fever

Colombia.—During the month of August 1940, 1 case of yellow fever with 1 death was reported in Colombia, no specific location being given.

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Public Health Reports

VOLUME 55 DECEMBER 13, 1940 NUMBER 50

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

Vol. 55 • DECEMBER 13, 1940 • *No. 50*

INFLUENZA

During the last week of November, an unusual incidence of acute upper respiratory infection was reported in California. Because of the mild nature of the attacks, the outbreak was not revealed by the official morbidity figures, but was first indicated by school absences and verbal reports. On December 5, Doctor Bertram P. Brown, State Director of Public Health, reported that laboratory tests indicated the epidemic to be influenza of type A, that it was affecting from 25 to 30 percent of the population in some localities, and that the highest incidence was in rural areas. A check of defense industries, however, revealed that 5 to 10 percent of the employees were absent because of the disease, and among approximately 25,000 personnel in the 11th Naval District there were 1,452 cases, giving an attack rate of about 6 percent for the period.

On December 10, Dr. John W. Oliphant, of the Public Health Service, reported that the epidemic was abating in San Diego and vicinity, but increasing slightly in Los Angeles and San Francisco, and that no unusual incidence of bronchopneumonia had been reported in any of the California cities.

A total of 9,663 cases of influenza was reported in the United States for the week ended December 7, as compared with 3,014 cases for the preceding week. California reported 6,772 cases, or 70 percent of the total. The incidence was lower in the northern and eastern States and highest in the western and southern areas.[1]

SMALLPOX IN THE UNITED STATES: ITS DECLINE AND GEOGRAPHIC DISTRIBUTION

By C. C. Dauer, M. D., *Epidemiologist, District of Columbia Health Department*

In the 20-year period from 1900 to 1919 slightly more than three-quarters of a million cases of smallpox were reported in the United States, and in the two succeeding decades the number reported totaled nearly 700,000 cases, 75 percent of which occurred in the decade from 1920 to 1929. During the period from 1900 to 1919, inclusive, 11,435

[1] See pp. 2327-2328.

deaths from this disease were recorded, and from 1920 to 1939 the number fell to 5,337, 90 percent of which occurred from 1920 to 1929.

Coincident with this decline in morbidity and mortality there has been a progressive change in the type of smallpox seen in the United States during the past four decades, a change from a large proportion of severe cases with a relatively high mortality to a greater percentage of the mild type with a low mortality. This change was discussed in considerable detail by Chapin[1] in an excellent report published in 1932. Chapin stated that the mild or alastrim type of smallpox may have originated in South Africa and that it appeared in the United States in 1896. It apparently entered Florida, from which locality it spread rapidly to all parts of the country.

This change in type of smallpox is one of the reasons for the marked decrease in mortality from the disease observed in recent years. According to Chapin's figures the fatality rate was 3.6 percent for the 5-year period from 1900 to 1904, during which time it is estimated that the severe or classical form of the disease constituted about 12.5 percent of all the cases reported. According to these same data the fatality rate had declined to approximately 0.8 percent in the 5-year period 1925–29, when only 3.0 percent of the total cases were classified as the severe type. In the period from 1935 to 1939, inclusive, the fatality rate declined still more, to 0.34 percent, but the exact proportion of mild and severe cases is unknown for this period of time. For the 30-year period covered by Chapin's studies, 1900 to 1929, approximately one and one-quarter million cases of the mild type were reported in the United States with a fatality rate of 0.56 percent, and about 57,000 cases of the severe form with a fatality rate of 16.40 percent.

Chapin was of the opinion that the malignant and mild forms represented two separate strains of the smallpox virus, and, although exhibiting some variations, the mild form bred true with no evidence of reversion to the malignant form. However, both types have been reported in the same community at approximately the same time.

The periodicity of the outbreaks of smallpox in the United States is very evident, but in the past half century there has been no constant period of time between peaks of incidence. (See table 1.) Since 1900 there have been 8 fairly distinct periods extending over 1 or more years when cases of the disease were reported in comparatively large numbers. The most severe of these outbreaks in point of numbers of cases reported occurred in 1921 and 1922 when about 220,000 cases

1 Chapin, C. V., and Smith, J.: Permanency of the mild type of smallpox. J. Prev. Med., 6: 273–320 (1932).

were reported. The second largest was in 1901 and 1902 when about 135,000 cases were reported. In the States located in areas where smallpox has been most prevalent, 4 or 5 outbreaks, and in a few instances 6 outbreaks, have occurred during the past 20 years. The most recent outbreak occurred in 1937, 1938, and 1939, but the number of cases reported was small compared with previous outbreaks. A total of 36,489 cases and 118 deaths were recorded for this 3-year period with a fatality rate of 0.32 percent. This exceedingly low mortality is a clear indication of a predominantly mild form of the disease in recent years in this country.

Smallpox has shown very distinct regional differences in prevalence in this country ever since reasonably reliable data on numbers of cases have become available for a large proportion of the population. The incidence has been higher in the North Central States and west of the Mississippi River. These groups of States have continued to contribute most of the cases reported for the whole country. Except for sporadic cases or small isolated outbreaks the disease has practically disappeared from the New England, Middle Atlantic, and the northern tier of the South Atlantic States. The incidence in the remainder of the South Atlantic and East South Central States has also declined to a very low level in recent years.

As indicated in table 1 the incidence of smallpox in the United States remained fairly high until 1931, following which time it declined to a low level for several years. In the 5-year period from 1932 to 1936 the average number of cases for the whole country was 7,770. However, during these years of generally low incidence in the remainder of the country two States, Wisconsin and Minnesota, had severe outbreaks. Several other States had only a slight decrease in cases from 1932 to 1936 as compared with 1927 to 1931. Some increase in smallpox occurred in Wisconsin, Idaho, Colorado, and California in 1933. The following year the number of cases increased again in Wisconsin and also in Minnesota, South Dakota, and Washington. In 1935 some increase in the disease occurred in South Dakota, Nebraska, Kansas, Montana, Wyoming, and Washington; and during 1936 in Illinois, Iowa, Missouri, and North Dakota. The sudden increase in smallpox in 1937 and 1938 probably was the result of an extension of the disease from the localized outbreaks occurring in the years just prior to the 1937-38 outbreak.

In order to show in greater detail the geographical distribution of smallpox for the years 1937 to 1939 inclusive, the number of cases by counties was secured and the rates for each year are shown in figures 1, 2, and 3. It is very evident that the disease was not evenly spread in States which as a whole had high case rates during 1 or more years.

TABLE 1.—*Smallpox in the United States, 1900–39*

Year	Number of cases [1]	Number of deaths [1]	Case fatality rate, percent	Year	Number of cases [1]	Number of deaths [1]	Case fatality rate, percent
1900	21,064	894	4.24	1920	110,672	492	.44
1901	62,374	1,376	2.20	1921	108,487	758	.69
1902	72,946	2,510	3.44	1922	33,305	901	2.70
1903	52,737	1,580	2.99	1923	30,890	165	.53
1904	31,697	1,282	4.04	1924	50,513	806	1.58
1905	19,417	406	2.09	1925	40,281	724	1.79
1906	15,223	90	.59	1926	32,691	387	1.18
1907	18,977	96	.50	1927	37,977	151	.39
1908	33,998	108	.31	1928	39,396	141	.35
1909	23,560	155	.65	1929	42,282	179	.42
1910	31,254	429	1.37	1930	48,907	182	.37
1911	23,044	174	.75	1931	30,151	108	.36
1912	23,566	305	1.20	1932	11,194	50	.44
1913	38,400	259	.67	1933	6,491	39	.60
1914	40,474	216	.53	1934	5,371	24	.44
1915	38,381	247	.64	1935	7,957	25	.31
1916	19,740	247	1.25	1936	7,834	35	.44
1917	47,508	320	.67	1937	11,673	34	.29
1918	80,334	414	.51	1938	14,939	46	.31
1919	62,876	327	.52	1939	9,877	38	.38

[1] Data from 1900 to 1928 from Chapin's report (loc. cit.). Data from 1929 to 1939 from supplements to Public Health Reports.

In 1937 Indiana, Illinois, Minnesota, Iowa, Missouri, North Dakota, Kansas, Montana, Idaho, and Oregon had comparatively high case rates but the rates were high only in localized groups of counties, particularly in the northwestern section of the country. Within these groups some counties had excessively high case rates. Four counties (1 in Missouri and 3 in Montana) had rates between 750 and 1,000 per 100,000 population; 5 counties (2 in Iowa and 1 each in Montana, Wyoming, and Oregon) had rates between 500 and 750; 30 counties were between 250 and 500; and 87 had 100 to 250 reported cases per 100,000 population. In several States a few isolated counties reported a large proportion of the total for the whole State. In Michigan and Ohio, 1 county in each State reported one-half and one-third, respectively, of the total.

As shown in figure 2, smallpox was more widely distributed in 1938 than in 1937, and comparatively large numbers of cases were reported in a large number of counties. The largest group of counties with excessively high rates was again located in the extreme northwestern section of the country. Widely scattered but smaller groups of counties mostly in the North Central States also reported the disease in excessive numbers. Two counties (1 each in Kentucky and Texas) had case rates in excess of 1,000 per 100,000 population; 4 counties (1 each in Colorado and Texas and 2 in Oregon) had rates between 750 and 1,000; the rates for 7 counties (1 in Wyoming and 2 each in Idaho, Montana, and South Dakota) ranged from 500 to 750; 42 had rates between 250 and 500; and 98 had rates between 100 and 250.

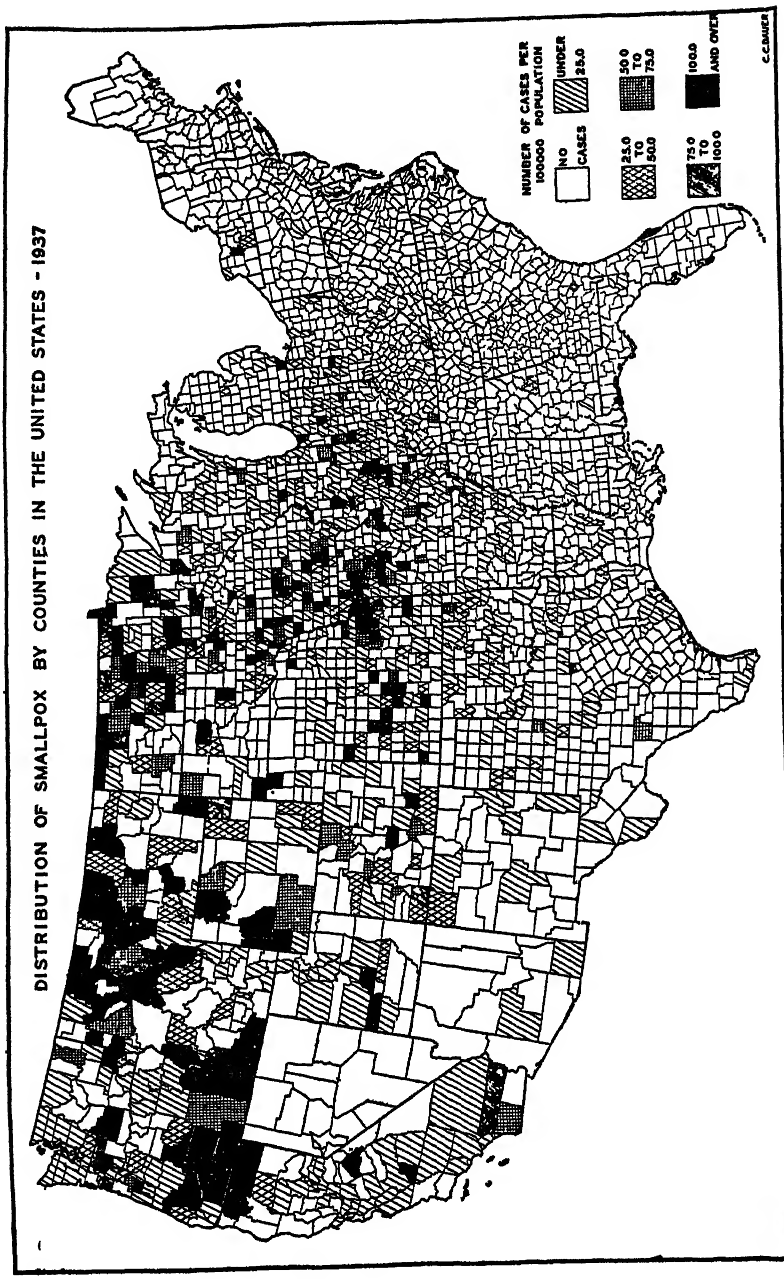
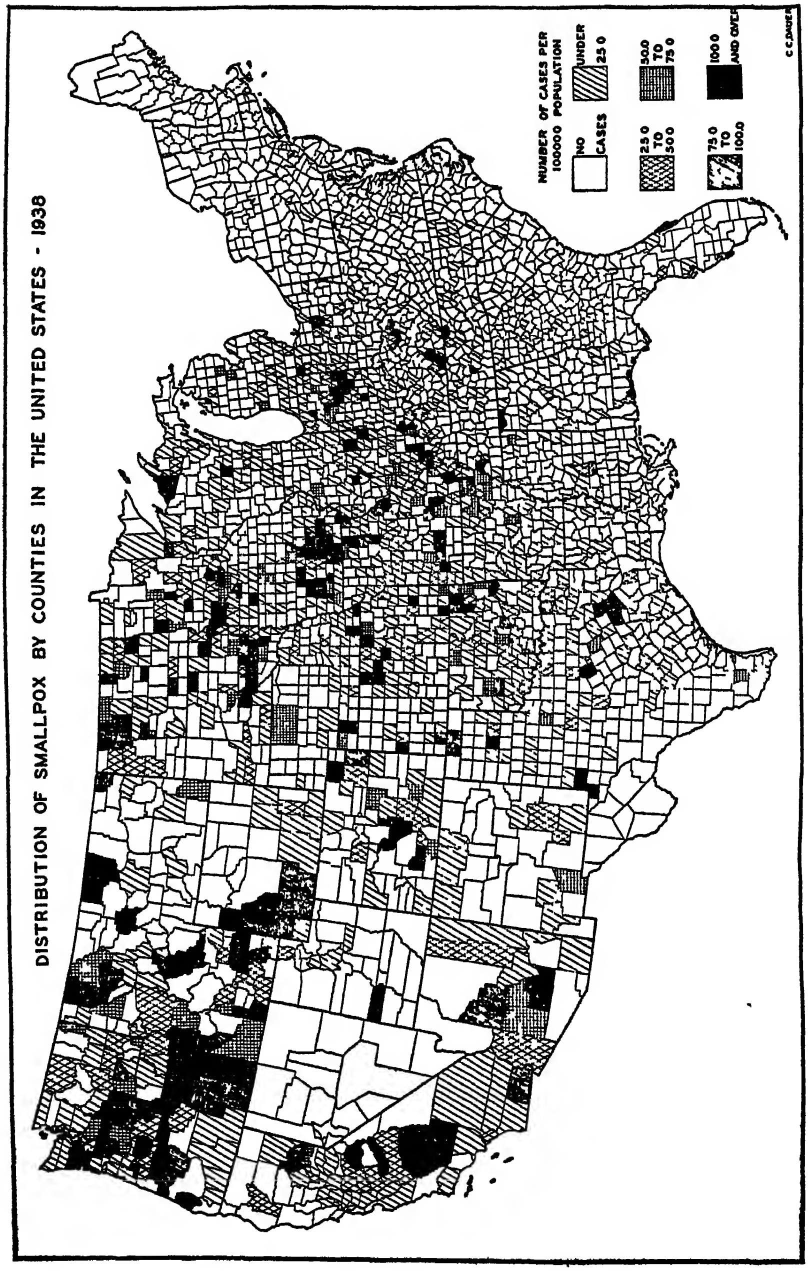

DISTRIBUTION OF SMALLPOX BY COUNTIES IN THE UNITED STATES - 1937
NUMBER OF CASES PER 100000 POPULATION
NO CASES
UNDER 25.0
25.0 TO 50.0
50.0 TO 75.0
75.0 TO 100.0
100.0 AND OVER
C.C.DAUER

FIGURE 1.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C.C.DAUER

FIGURE 2.

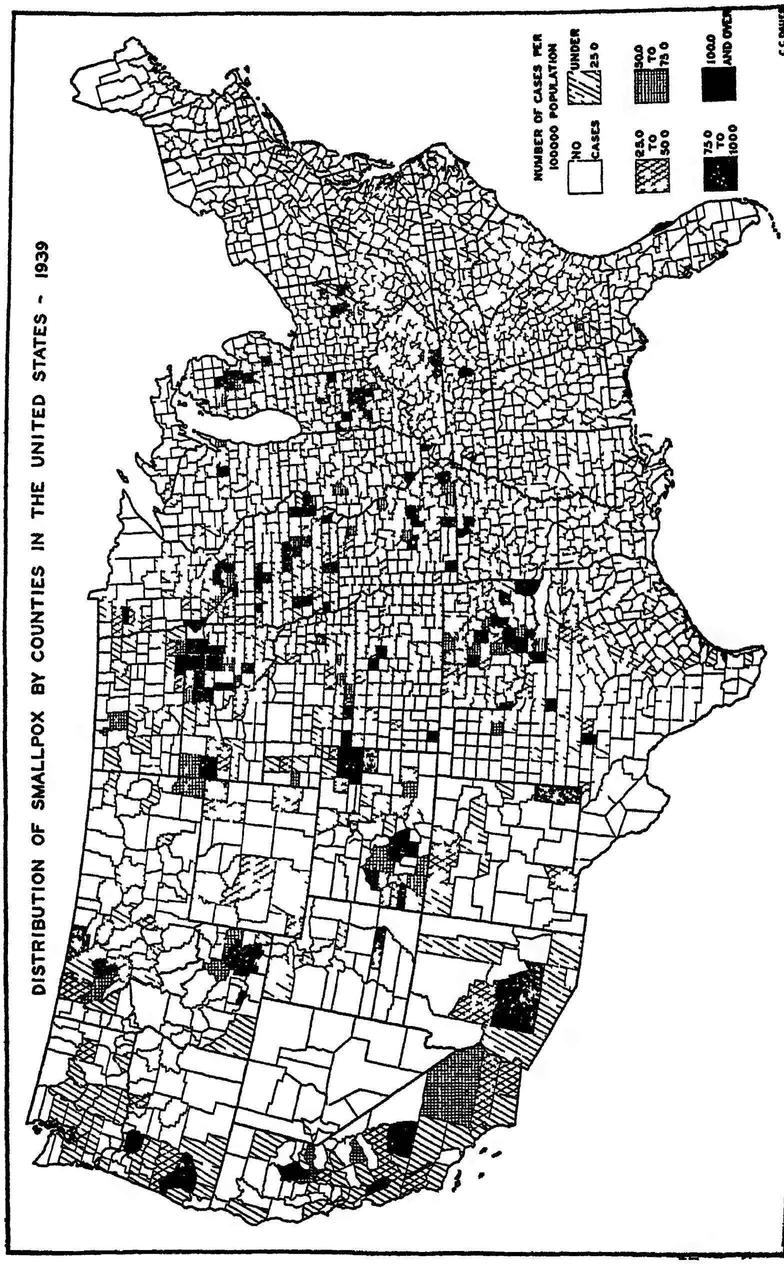
DISTRIBUTION OF SMALLPOX BY COUNTIES IN THE UNITED STATES - 1939
NUMBER OF CASES PER 100000 POPULATION
NO CASES
UNDER 25.0
25.0 TO 50.0
50.0 TO 75.0
75.0 TO 100.0
100.0 AND OVER
C C DAUER

FIGURE 3

In 1939 the number of cases of smallpox for the entire country decreased by about one-third as compared with 1938, but in Ohio, Michigan, Nebraska, Tennessee, Oklahoma, and Arizona there was an increase in numbers as compared with 1937 and 1938. The increase in the above-mentioned States represented for the most part an extension of the disease from other affected areas in 1937 and 1938. In 1939 only a few counties in the extreme northwest had high incidence rates and in the central part of the country there were not only fewer but smaller groups of counties with high case rates. In a few instances counties which had a high incidence in 1938 also reported a large number of cases in 1939. Two counties (1 each in Michigan and Tennessee) had over 1,000 cases per 100,000 population; 1 county in Colorado had a rate of 918; 4 counties (1 each in Ohio, South Dakota, Iowa, and Tennessee) had rates between 500 and 750; 17 had rates between 250 and 500; and 70 counties reported between 100 and 250 cases per 100,000 population.

During the 3 years certain counties with excessively high case rates were those with small populations in which a few cases produced a high rate. However, these counties were usually in close proximity to others with excessively high rates and the high rates of the former cannot be dismissed as chance occurrences.

While a large part of the United States experienced a high incidence of smallpox from 1937 to 1939, as described above, the New England States were free of the disease, except for 1 case in Vermont and 6 in Connecticut. The Middle and South Atlantic States reported only a comparatively few cases. Wisconsin, Nebraska, and Utah had a comparatively low incidence of smallpox as compared with surrounding States but these States had reported large numbers of cases just prior to 1937.

Comparatively few of the counties with a high incidence of smallpox in 1937, 1938, or 1939 contained large cities, which suggests a higher incidence of the disease in the rural populations of the areas affected. However, during this period of 3 years the disease occurred in various cities in different degrees of intensity from sporadic cases to severe epidemics. Three large cities, Los Angeles, Calif., Portland, Oreg., and St. Louis, Mo., reported a small number of cases weekly from January to May, inclusive, during each of the 3 years. The largest number reported during any one week was 12 in Los Angeles, 11 in Portland, and 6 in St. Louis. Minneapolis also reported cases in small numbers over a period of 3 months in 1938 and 1939. St. Paul reported sporadic cases during the winter and spring of 1937 but in large numbers in December 1937, and throughout January, February, and March of 1938. The largest number reported for any one week in St. Paul was 53 cases. Several cities for which records are available had outbreaks of considerable severity. In St. Joseph, Mo., cases

were reported for 24 consecutive weeks from December 1936 to June 1937, the greatest number being 58 for any single week. A total of 642 cases was reported, resulting in a case rate of 850 per 100,000 population. Boise, Idaho, reported 99 cases (case rate, 380) during a period of 21 weeks from January to May, inclusive, in 1937. In Indianapolis from October 1938 to June 1939, 530 cases (case rate, 138) occurred. During this period of 36 weeks cases were reported every week except one and the largest number in any one week was 57. A fairly severe outbreak also occurred in Aberdeen, S. Dak., in 1939 when 117 cases (case rate, 688) were reported over a period of 6 months from January to June, inclusive. Other cities in the North Central, West South Central, Mountain, and Pacific States reported varying numbers of smallpox cases over periods of a few weeks to several months during 1937, 1938, and 1939.

TABLE 2.—*Average annual case rates, 1927–31 and 1932–36, and number of smallpox cases reported and case rates in 1937, 1938, and 1939, by States*

State	Average annual case rates per 100,000 population		Number of cases reported			Case rates per 100,000 population		
	1927–31	1932–36	1937	1938	1939	1937	1938	1939
New England:								
Maine	5.0	0.5	0	0	0	0	0	0
New Hampshire	1.2	.8	0	0	0	0	0	0
Vermont	37.0	14.0	1	0	0	.3	0	0
Massachusetts	1.4	.2	0	0	0	0	0	0
Rhode Island	.2	0	0	0	0	0	0	0
Connecticut	3.9	1.4	0	0	0	0	0	0
Middle Atlantic:								
New York	2.6	.5	72	0	51	.6	0	.4
New Jersey	.8	0	0	0	0	0	0	0
Pennsylvania	.4	.1	0	0	1	0	0	(1)
East North Central:								
Ohio	39.0	4.1	118	305	615	1.7	5.4	9.1
Indiana	124.0	4.3	601	1,559	1,445	17.0	45.0	42.0
Illinois	33.0	3.0	919	965	376	10.0	16.0	4.7
Michigan	35.0	1.6	152	274	371	3.2	5.7	7.8
Wisconsin	20.0	19.0	207	213	162	7.1	7.3	5.6
West North Central:								
Minnesota	8.7	9.5	671	859	492	25.0	33.0	19.0
Iowa	84.0	24.0	1,316	1,170	1,057	52.0	46.0	42.0
Missouri	45.0	5.8	1,751	1,186	531	44.0	30.0	13.0
North Dakota	53.0	19.0	735	411	87	113.0	64.0	14.0
South Dakota	144.0	45.0	176	428	424	28.0	67.0	66.0
Nebraska	104.0	40.0	109	196	223	13.0	15.0	16.0
Kansas	115.0	18.0	604	513	199	32.0	27.0	11.0
South Atlantic:								
Delaware	.4	.8	0	0	0	0	0	0
Maryland	.5	(1)	0	0	0	0	0	0
District of Columbia	3.2	.3	0	0	0	0	0	0
Virginia	17.0	.5	6	5	0	.2	.2	0
West Virginia	49.0	1.7	18	8	26	1.0	.4	1.4
North Carolina	34.0	1.0	11	35	15	.3	1.0	.4
South Carolina	14.0	1.1	15	4	5	.6	.2	.2
Georgia	18.0	.8	15	33	47	.5	1.1	1.5
Florida	22.0	.6	7	15	4	.4	.9	.2
East South Central:								
Kentucky	21.0	2.0	76	494	89	2.6	17.0	3.1
Tennessee	23.0	4.1	89	162	283	1.3	5.6	9.7
Alabama	18.0	4.3	48	75	26	1.7	2.7	.9
Mississippi	23.0	7.2	23	116	11	1.1	5.3	.5

[1] Less than 0.1.

TABLE 2.—*Average annual case rates, 1927–31 and 1932–36, and number of smallpo cases reported and case rates in 1937, 1938, and 1939, by States*—Continued

State	Average annual case rates per 100,000 population		Number of cases reported			Case rates per 100,000 population		
	1927–31	1932–36	1937	1938	1939	1937	1938	1939
West South Central:								
Arkansas	20.0	7.5	97	245	136	4.8	12.0	6.7
Louisiana	19.0	3.1	19	20	14	.9	.9	.7
Oklahoma	97.0	7.6	116	605	873	5.0	26.0	36.0
Texas	39.0	11.0	166	636	502	2.7	10.0	8.2
Mountain:								
Montana	93.0	79.0	808	314	55	169.0	59.0	10.0
Idaho	138.0	37.0	371	543	132	77.0	112.0	25.0
Wyoming	85.0	56.0	160	57	23	66.0	23.0	9.7
Colorado	50.0	16.0	215	287	270	19.0	26.0	24.0
New Mexico	23.0	5.1	18	53	33	4.2	13.0	7.8
Arizona	60.0	2.4	4	181	241	1.0	45.0	60.0
Utah	(2)	19.0	51	29	17	9.3	5.3	3.1
Nevada	(2)	6.5	3	0	2	2.7	0	1.8
Pacific:								
Washington	119.0	40.0	478	966	89	27.0	59.0	5.3
Oregon	123.0	20.0	630	651	236	58.0	60.0	20.0
California	33.0	7.6	697	1,266	708	12.0	21.0	12.0
Total	32.4	6.1	11,673	14,939	9,877	9.1	11.6	7.7

[2] Data not available.

The unenviable record of the United States with respect to the incidence of smallpox repeatedly has been pointed out in various reports. However, as previously stated in this paper, a large proportion of the cases reported in the past decade has occurred in the north central and northwestern sections of the country while in the eastern part of the United States the disease has practically vanished. In many of the States located in the latter area a large proportion of the population has been protected by a continuous program of vaccination year after year. It is a fact worth noting that where laws requiring vaccination for school attendance have been in force for a number of years smallpox has practically disappeared, while nearly all of the cases reported in recent years have occurred in the sections where there are no such laws.

QUALIFICATIONS OF PROFESSIONAL PUBLIC HEALTH PERSONNEL [1]

I. PLAN AND SCOPE OF THE SURVEY

By MAYHEW DERRYBERRY, *Senior Health Education Analyst,* and GEORGE CASWELL, *United States Public Health Service*

That a trained personnel is of paramount importance to the success of a public health program has been repeatedly pointed out in treatises, surveys, and studies of public health administration. Almost all of these have stressed the need for a better trained staff and

[1] From the Division of Public Health Methods, National Institute of Health.

recommended not only that health departments require new applicants to come better prepared but also that training in service be provided for those already employed. It is, however, only within recent years that any concerted action has been taken to put these recommendations into effect.

Perhaps the greatest impetus to this movement resulted from the provisions of Title V and Title VI of the Social Security Act and the more recent Venereal Disease Control Act,[2] both of which made available funds for training public health personnel. Two groups that have helped to give direction to the movement are the Committee on Professional Education of the American Public Health Association and the Committee on Professional Education and Qualifications of Public Health Personnel, representing the Conference of State and Territorial Health Officers. Prior to the passage of the Social Security Act, the Committee on Professional Education had assumed the responsibility of developing qualification standards and, to date, has outlined and published, with the approval of the Association, eight reports recommending minimum qualifications for various types of public health workers.

The Committee on Professional Education and Qualifications of Public Health Personnel was appointed in 1935 immediately after the Social Security Act went into effect. Its chief function has been to advise the Public Health Service in the distribution of training funds and to report annually through the Conference its recommendations as to minimum qualifications for newly appointed employees in official health departments. The recommendations of the two committees are almost identical, inasmuch as they have always worked in the closest harmony.

After desirable minimum qualifications had been set up, the two committees felt the need for objective information on the level of training and experience of existing personnel: To what extent do employees now in service meet the qualifications that have been set up? How much training must be given them before they reach the minimum qualification standards? How old are they and how much replacement must be expected? Answers to these and similar questions were needed to determine the future training needs for those now in service and those to be employed. Accordingly, the two committees joined in requesting the Surgeon General of the Public Health Service to undertake a study on the level of training and the amount of experience possessed by workers in official health departments. This paper is the first of a series reporting the findings of the resulting survey.

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[2] Approved May 24, 1938.

PREVIOUS STUDIES

One of the early evidences of a growing appreciation of the need for trained public health employees to do a specialized job is found in the Health Survey of 86 Cities,[3] in which the employment of a full-time trained health officer is called the foundation for effective health work in the community. The Survey, however, undertook only a limited analysis of the qualifications of the 86 health officers in the departments studied. Freeman [4] surveyed a sampling of rural health departments as of 1929 and summarized the information available on training and experience of the health officers but made no mention of the training of other employees.

In 1930 the White House Conference on Child Health and Protection [5] considered the problem of training of public health personnel and recommended increased facilities for instruction in public health as a specialized field, expansion of the curricula offered in medical schools generally, and better teaching of the subject matter in courses offered. In its report, analyzing the training and experience of over 3,600 physicians, nurses, and sanitarians in 548 health departments, the Conference came to the broad conclusion that "experience alone is still the route traveled by most public health workers." [6] At the same time, significantly enough, the training of public health nurses, although described as unsatisfactory in some details, was declared to be on the whole better in relation to the demands of their position than that of physicians or sanitary engineers. Lay sanitary inspectors were reported as having little or no preparation for their work except that acquired through experience. It is implied that the training of sanitary engineers and veterinarians was somewhat more satisfactory than that of lay personnel.

The White House Conference recommended several somewhat tentative courses of action, prefaced with the explanation that, pending the adoption of educational standards by State health departments, such measures seemed advisable. As is well known, a number of the courses of action recommended in 1930 have subsequently been put into practice. Among the recommendations made may be cited the following: (*a*) The setting up, by various foundations, of fellowships and scholarships in public health for the benefit of those about to enter the field or those at work in it; (*b*) Federal consultation and assistance in training through loans of qualified instructors; (*c*) Federal grants-in-aid to State and local departments, conditional on their employment of approved profes-

[3] Health Survey of 86 Cities. American Child Health Association, Research Division, New York, 1925.

[4] Freeman, Allen W.: A Study of Rural Public Health Service. The Commonwealth Fund, New York, 1933.

[5] Public Health Organization, vol. IIA, Reports of the White House Conference on Child Health and Protection. The Century Co., New York, 1932.

[6] Op. cit., p. 265.

sional personnel; and (*d*) the use of the resources peculiar to the Federal medical service in training. Furthermore, State health departments were advised to require definite educational qualifications for professional personnel, and to enforce them, if need be, by a licensing system or refusal of State subsidy to local departments.

The National Organization for Public Health Nursing[7] in 1934, and Marian Randall[8] in 1937 for the Organization, conducted surveys in a sampling of nursing organizations and pointed out the necessity for not only an inventory of the educational status of currently employed public health workers but also positive action toward the improvement of the conditions found. Livingston Farrand in his foreword to the earlier survey speaks of the lack of training as an obstacle to advance in the whole field.

THE PRESENT SURVEY—COLLECTION OF DATA

The present survey, begun in July 1938, had as one of its objectives, therefore, a comprehensive inventory of the educational attainment and experience of currently employed full-time professional workers in official health departments. The most practical method of collecting the desired information was by questionnaires, submitted directly to the individuals concerned. Thus, it was planned, for the first time since 1930, to secure data from all jurisdictions under full-time direction and from all classes of professional personnel.

Accordingly, a schedule (see figs. 1 and 2) was devised, requesting, from each individual, information on age, sex, color, official position, employing jurisdiction, educational attainment (including degrees, certificates, and other academic or professional distinctions held), and full employment history. When letters and copies of the schedule were sent to all State and territorial health officers to request their cooperation in collecting the data, the response was gratifyingly prompt and enthusiastic.

Early in August 1938, the State and territorial health officers were sent supplies of the questionnaires for their departments and were asked whether they would distribute blanks to local health departments or authorize the Public Health Service to do so. Most of the States chose the latter alternative and questionnaires were sent from Washington to the local health officers, with the request that the forms be distributed and, when complete, returned as a group. Data were requested only from full-time professional employees working in other than institutional positions.

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[7] Survey of Public Health Nursing by the National Organization for Public Health Nursing. The Commonwealth Fund, New York, 1934.

[8] Personnel Policies in Public Health Nursing, prepared for the Committee on Personnel Practices in Official Agencies of the National Organization for Public Health Nursing by Marian G. Randall. Macmillan, New York, 1937.

COVERAGE

By January 1, 1939, when final returns had been received from the field, out of 1,148 jurisdictions canvassed, 1,114 had submitted schedules. This number is 97 percent of the State, county (or district), and city health departments with full-time health officers, known to be in operation as of October 1, 1938. In the few instances in which the position of health officer was vacant, the jurisdiction was included if the vacancy was a full-time position and the unit had other professional personnel.

Final returns include schedules from the 52 State and territorial health departments,[9] from 99.6 percent of the organized counties and districts, and from 89.1 percent of the cities under full-time direction. Of the 31 cities failing to respond, three had populations (1930) of 100,000 or more; the remaining 28 were mainly small jurisdictions in the eastern States with health departments having lay secretaries or nonmedical health officers but rarely full-time professional staffs.

A total of 18,800 individual schedules were submitted; but among that number about 2,100 came from employees who were (*a*) not full-time workers; (*b*) paid from emergency funds; (*c*) employed full-time in institutions; or (*d*) nonprofessional. After eliminating these four classes of schedules, the remaining 16,670 that were in accord with the original plans for the survey were analyzed. It is estimated that the data analyzed cover 95 percent of the full-time professional personnel employed in official full-time health departments in the United States and its possessions.

Table 1 shows the distribution of jurisdictions reporting, by State and type of jurisdiction, and the number of schedules analyzed for each State. Of the departments in the 808 county and district jurisdictions, 537 (66.5 percent) are single-county units serving the entire population; 69 (8.5 percent) are single-county units in counties with one or more separate city departments serving a part of the population. The remainder are district units serving more than one county. Among district units, 65 serve two; 45, three, and 74, four or more counties each. Sixteen others are not classified because they serve areas not made up entirely of whole counties but of other minor political divisions and combinations of such divisions. Among city jurisdictions, 13 of the 254 departments serve populations (1930) of 500,000 or more; none serves a city population under 10,000. The distribution of city departments according to population served is as follows:

[9] Throughout the survey the District of Columbia is treated as a State.

City population	Number of health departments in survey
10,000–19,999	65
20,000–29,999	37
30,000–49,999	39
50,000–74,999	30
75,000–99,999	17
100,000–249,999	34
250,000–499,999	19
500,000–999,999	8
1,000,000 or more	5

ANALYSIS OF THE DATA

Preliminary examination, follow-up on incomplete returns, editing, coding, and other processing of schedules were done with the aid of a grant from the Works Progress Administration with which a processing unit was conducted in Philadelphia.[10] The work was done under the supervision of the Public Health Service staff and each process was carefully checked to insure accuracy of performance. Final analysis was completed in the National Institute of Health.

As schedules were received, they were examined for completeness and those believed to be deficient in reporting employment history, educational attainment, professional status, or length of time in positions held (especially the present position) were returned to the field for further information. The most common deficiency was failure to report complete employment history. Individuals often reported only their health department or public health employment. In some cases the original schedule had not included periods of unemployment; as a whole, errors or omissions in reporting were due to misinterpretation of the intent of the schedule.

After the schedules from each jurisdiction had been checked in the manner indicated, the personnel represented by the schedules were classified according to the professional functions they perform and the editing and coding were based on this classification, especially insofar as training and experience data are concerned. Table 2 gives the distribution of schedules analyzed, by professional classification and employing jurisdiction. It will be noted that the major groups are the medical, nursing, sanitation, and laboratory personnel, with the largest group, nursing, making up almost half the total. By jurisdiction, almost half the schedules are from cities, a third from counties, and the remainder from State health departments.

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[10] Grateful acknowledgment is made for the cooperation of the Works Progress Administration and State and local health officers and members of their staffs throughout the country. The present survey would have been impossible without the assistance of all who cooperated to make the coverage practically complete. The clerical labor of processing could not have been undertaken without the assistance of the Works Progress Administration grant.

TABLE 1.—*Response to personnel questionnaire, by States and types of jurisdictions canvassed*

State	Full-time jurisdictions from which—						Percentage of jurisdictions responding	Total usable schedules from all jurisdictions
	Data were requested			Data were received				
	Total [1]	Counties [2]	Cities	Total [1]	Counties [2]	Cities		
Total	1,148	811	285	1,114	808	254	97.0	16,670
Alabama	68	67	----	68	67	----	100.0	431
Alaska	1	----	----	1	----	----	100.0	20
Arizona	6	5	----	6	5	----	100.0	61
Arkansas	31	29	1	31	29	1	100.0	154
California	37	22	14	34	21	12	91.9	1,353
Colorado	4	----	3	4	----	3	100.0	148
Connecticut	9	----	8	9	----	8	100.0	226
Delaware	1	----	----	1	----	----	100.0	55
District of Columbia	1	----	----	1	----	----	100.0	154
Florida	18	14	3	18	14	3	100.0	222
Georgia	49	46	2	48	45	2	98.0	346
Hawaii	1	----	----	1	----	----	100.0	128
Idaho	7	4	2	5	4	----	71.4	58
Illinois	28	15	12	28	15	12	100.0	836
Indiana	8	6	1	7	6	----	87.5	124
Iowa	9	7	1	9	7	1	100.0	85
Kansas	7	4	2	7	4	2	100.0	98
Kentucky	77	75	1	77	75	1	100.0	405
Louisiana	39	38	----	39	38	----	100.0	199
Maine	14	7	6	14	7	6	100.0	80
Maryland	25	23	1	25	23	1	100.0	404
Massachusetts	46	4	41	42	4	37	91.3	668
Michigan	48	36	11	47	35	11	97.9	1,002
Minnesota	10	5	4	10	5	4	100.0	170
Mississippi	32	31	----	32	31	----	100.0	233
Missouri	25	18	6	21	18	2	84.0	360
Montana	4	3	----	4	3	----	100.0	38
Nebraska	6	4	1	6	4	1	100.0	56
Nevada	1	----	----	1	----	----	100.0	19
New Hampshire	6	----	5	5	----	4	83.3	63
New Jersey	30	----	29	29	----	28	96.7	660
New Mexico	11	10	----	11	10	----	100.0	98
New York	40	26	13	40	26	13	100.0	2,527
North Carolina	59	52	6	59	52	6	100.0	528
North Dakota	3	1	1	3	1	1	100.0	24
Ohio	65	48	16	65	48	16	100.0	802
Oklahoma	18	17	----	18	17	----	100.0	137
Oregon	15	13	1	15	13	1	100.0	133
Pennsylvania	55	----	54	44	----	43	80.0	724
Puerto Rico	1	----	----	1	----	----	100.0	473
Rhode Island	6	3	2	6	3	2	100.0	97
South Carolina	39	32	6	36	32	3	92.3	206
South Dakota	8	7	----	8	7	----	100.0	55
Tennessee	43	39	3	43	39	3	100.0	419
Texas	26	19	6	25	19	5	96.2	519
Utah	7	6	----	7	6	----	100.0	83
Vermont	1	----	----	1	----	----	100.0	22
Virginia	38	29	8	37	29	7	97.4	300
Washington	17	14	2	17	14	2	100.0	218
West Virginia	23	20	2	23	20	2	100.0	127
Wisconsin	24	12	11	24	12	11	100.0	308
Wyoming	1	----	----	1	----	----	100.0	14
Percentage of counties responding							99.6	----
Percentage of cities responding							89.1	----

[1] Includes State health departments, all of which responded.
[2] Includes districts, whether made up entirely of whole counties or otherwise.

For each of the four major classificat ons of personnel, i. e., medical, nursing, sanitation, and laboratory workers, subsequent papers will present the levels of educational attainment both in academic training and in public health, and an analysis of employment history. These facts will be shown separately for administrators and staff employees and by jurisdiction when significant differences between the three

TABLE 2.—*Response to personnel questionnaire, by professional classification* [1] *of personnel and type of jurisdiction*

Professional classification	Total		Type of jurisdiction					
			State		County or district		City	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	16,670	100.0	3,845	100.0	5,259	100.0	7,566	100.0
Medical	1,956	11.7	487	12.7	951	18.1	518	6.8
Nursing	7,931	47.6	1,186	30.9	2,864	54.5	3,881	51.3
Sanitation	4,443	26.7	1,017	26.4	1,211	23.0	2,215	29.3
Laboratory	1,291	7.7	705	18.3	111	2.1	475	6.3
All others	1,049	6.3	450	11.7	122	2.3	477	6.3
Percentage of total schedules		100.0		23.1		31.5		45.4
Jurisdictions represented	1,114		52		808		254	
Percentage of total canvassed		97.0		100.0		99.6		89.1

[1] By function, rather than training; e.g., a physician directing a sanitary corps is tabulated as a sanitation worker.

types of jurisdictions are found. The reports to follow will carry the following titles: Qualifications of Health Officers and Other Medical Personnel, Qualifications of Nurses, Qualifications of Sanitation Personnel, and Qualifications of Laboratory Workers.

WASHING FACILITIES FOR FOOD HANDLERS ON SHIPS

Report of a Survey

By G. C. SHERRARD, *Acting Assistant Surgeon, United States Public Health Service*

The quarantine histories of vessels arriving at the port of New York during recent years show a frequent incidence of intestinal disturbances among passengers and crews. These infections appear to have occurred mainly among persons on passenger vessels having large personnels in the stewards' departments. Both passengers and crew have been afflicted in about equal proportion to their numbers, indicating a common source of infection. The epidemiological investigations of these cases have directed suspicion to food handlers as the possible sources of infection.

The necessity for cleanliness in the handling and preparation of food is obvious. If, as often happens, cracked ice, salads, and sandwich material, to mention a few articles, are handled with soiled hands, there is considerable possibility of transferring infection to persons consuming such food and drink. If, on the other hand, a food handler washed his hands thoroughly after leaving the toilet or after other contamination and before handling food and drink, there is less likelihood of causing illness among the consumers.

However, to insure clean hands there must be convenient and reasonably adequate washing facilities. Therefore, when gastrointestinal diseases were frequently encountered on vessels arriving in New York, it was believed that faulty food handling and lack of cleanliness, at least, might be suspected of being contributing factors.

At the suggestion of Dr. Robert Oleson, chief quarantine officer for the port of New York, a survey was made of a sufficient number of vessels engaged in commercial trade to give an approximate indication of the kind and extent of the facilities provided for washing and cleansing the hands of those concerned with the handling of foods.

The surveys of washing facilities were made by sanitary inspectors attached to the quarantine station, under instructions from officers familiar with the internal arrangements of vessels and the general requirements for insuring hand cleanliness. However, in many instances, the findings represent individual judgments which may not coincide, but it is believed that the percentage of error from this source is small and does not seriously disturb the general result. At times, because of crew changes or crew absence while the survey was being made, it was difficult to obtain accurate information as to the location and type of washing facilities. However, here again, only an insignificant error could have resulted. The data obtained during the survey are presented in table 1.

TABLE 1.—*Number and location of washing facilities, towels, and soap on 240 American and 394 foreign vessels inspected in New York* [1]

Kind of facilities	Location of facilities					
	American vessels			Foreign vessels		
	Pantry	Galley	Quarters	Pantry	Galley	Quarters
Running water:						
Hot and cold	97	109	109	75	83	47
Cold only	82	75	71	111	110	106
None	61	56	60	208	201	241
Hand towels:						
Individual	85	77	187	156	146	319
Common	22	24	7	42	31	20
None	133	130	31	196	217	39
Hand soap:						
Present	160	158	194	244	236	295
None	80	78	31	150	158	87

[1] Figures for hand towels and soap in galleys and pantries do not include a few vessels for which data were not obtainable; therefore these totals are less than that of the total number of ships surveyed.

Conveniently located hot and cold running water is a most important requisite for cleansing hands. Reference to the table shows that of the 240 American vessels surveyed only 97, or 40 percent, have such facilities in pantries for the use of food handlers. The percentage of vessels having like facilities in the galleys and quarters is only slightly greater. Of the 394 foreign vessels surveyed, both hot and cold run-

ning water was available in the pantries of only 19 percent of the vessels, in the galleys of 21 percent, and in the food handlers' quarters of 12 percent. Thus, it will be seen that approximately 60 percent of the American and 80 percent of foreign vessels are lacking in the most important facility for the cleansing of hands. In addition to the lack of cold and hot running water, the survey shows that approximately 25 percent of American and 50 percent of foreign vessels have no running water available in at least one of their food-handling compartments, it being necessary to carry water from an outside source into the galley and pantry. In the great majority of those cases in which running water was present in food-handling compartments, the installations were designed for washing dishes and utensils and not for the separate washing of hands.

In the matter of hand towels deficiencies were also noted, as this item was found to be lacking in the galleys or pantries of slightly over one-half of both American and foreign vessels. On these vessels, when hands became wet, the food handlers used either the drying cloths provided for dishes or their not too clean aprons and trousers. It might be argued that from a sanitary viewpoint hand towels are not essential, but experience has shown that unless towels are provided there is a reluctance to wash.

With regard to hand soap, this item was found present in more instances than were the other facilities, and when not present there was usually a substitute in the form of dishwashing powder. In this connection, the main weakness from a sanitary point of view appeared to be the lack of a convenient fixture or container for the soap, which would attract attention and thus promote its use.

From the tabulated data it will be seen that a large proportion of ships are woefully lacking in facilities for the personal cleanliness and sanitation of those members of the crew who prepare and handle foods in the galleys and pantries.

A separate tabulation has been made of American vessels for the purpose of comparison and to obtain data upon which corrective measures can be based. From this tabulation it will be seen that while American ships compare very favorably with foreign ships in the matter of sanitary facilities, their status is only relatively better.

In addition to the many ships having no provisions for running water, soap, basins, and individual towels in compartments where foods are prepared and served, there appears to be an almost total lack of understanding on the part of food handlers as to the value or necessity of hand cleanliness. In fact, it may be said that educational measures along this line appear to have been neglected both by the shipping interests concerned and public health authorities.

Unless suitable sanitary facilities are provided for food handlers, together with proper training in, and enforcement of, approved sani-

tary measures, it is logical to assume that passenger ships with a large culinary personnel afford a greater hazard for the transmission of intestinal infections through the medium of food handlers than ships with relatively few who are engaged in handling foods. A history of gastrointestinal infections occurring on ships entering the port of New York confirms this supposition, most of the cases having occurred on passenger vessels.

Because of the absence of sanitary facilities and instruction of personnel in hygiene, it must be assumed that the path between ships' toilets and table food is frequently lacking in sanitary barriers. For the correction of this defect three general measures are suggested.

1. The installation of adequate and conveniently located washing facilities in galleys, pantries, and food-handlers' quarters on new ships during construction.
2. The installation of like facilities especially in the galley and pantry, on ships already in operation but which do not now provide such facilities, due consideration being given to the economic aspects, especially as regards the type of vessel and trade in which it is engaged.
3. The education of owners, operators, officers, and crews of vessels relative to sanitary precautions to be taken by food handlers, and the hazards to health when such precautions are neglected. Special emphasis should be placed on the esthetic aspects of the subject.

With regard to the equipping of new vessels with proper sanitary facilities for food handlers, this can most easily be accomplished by the ratproofing division of the United States Public Health Service when ratproofing measures are undertaken. On old vessels the problem is much more difficult, as the cost, suitable space, number of passengers and crew carried, together with the remaining economic aspects, must all be considered. On these ships the work could be more advantageously supervised by sanitary inspectors at the various quarantine stations.

Once the proper sanitary facilities are installed, the problem resolves itself into insuring their intelligent use by those concerned. This can be done by a gradual and persistent sanitary education of both the handler and consumer of foods. If the regular consumers of foods on board ship (officers especially) are informed as to the possible insanitary chain of events extending from toilets to dinner table, they are going to be more observant as to the sanitary precautions taken. Likewise, the owners and operators of ships will be more apt to approve reasonable expenditures for new installations when informed of the possible expense and loss of ships' time resulting from illness due to the lack of proper sanitary facilities. By no means the least concern of ship's operators is the strong possibility of legal suits being brought by persons who allegedly became ill as the result of faulty food handling.

On American ships the galley and pantry personnel are in a continual process of change from shore to ship and vice versa, and for

this reason the intensive medical examination of food handlers at intervals sufficiently frequent to prevent the transmission of intestinal infections appears impractical. The logical method of approach would seem to be along the lines of sanitary education, supervision, and provision for sanitary facilities at strategic locations on board ships.

Progress along the sanitary lines herein outlined has already been made. The Naval Architect of the Public Health Service, the Maritime Commission, and private shipbuilders are cooperating by including sanitary specifications in the design of new ships. Through the efforts of the sanitary inspectors employed at the New York Quarantine Station, new washing facilities are being installed on some of the ships already in service. These installations are the result of inspections, recommendations, and instruction given while such ships are undergoing overhaul and repair. In addition, the necessity for cleanliness in handling foods is explained at every opportunity. This line of activity apparently has fruitful possibilities.

A STUDY OF MEDICAL PROBLEMS ASSOCIATED WITH TRANSIENTS [1]

A Review

In the category of "transients" are the thousands of needy persons who, through the application of residence and technically related requirements, are discriminated against in programs of material aid and public medical care. They are the uncounted individuals, variously estimated at 200,000 to 1,000,000, who are "on the road" and who are unable to procure without assistance the necessities of life.

The study reported here is limited to the continental United States and is concerned with the health problems associated with transients as they are affected by the mode of life and social opportunities of these persons. The study attempts to determine: (1) The origin of transiency from migration and the importance of lack of health as a cause, (2) the statutory limitations on public assistance to transients, (3) the administrative practices of agencies giving assistance to transients, (4) the medical needs of transients, (5) the influence of transients on community health, and (6) the most equitable and practical solution of the medical problems of transients and transiency.

Varied sources of material were resorted to in the preparation of the report. Besides the information drawn from a considerable body of documentary matter, original data are also presented which were derived from: (*a*) About 11,000 schedules of some 16,000 transients who applied for public assistance in 20 cities of 15 States, (*b*) 432 schedules

[1] Public Health Bulletin No. 258. A Study of Medical Problems Associated with Transients. By Charles F. Blankenship and Fred Safier. Government Printing Office, Washington, 1940. Available from the Superintendent of Documents, Washington, D. C., at 25 cents per copy.

on the admission policies of public assistance agencies in the same cities, (*c*) records of application of 1,488 transients for in-patient care at a large charity hospital, (*d*) serological reactions of 1,170 inmates of a large municipal shelter for homeless men, (*e*) results of chest X-ray examinations of transients in 19 cotton camps in a southwestern State, and (*f*) replies from 42 local governmental and nonprofit association general hospitals in California to a questionnaire concerning the number of transients hospitalized during a year.

Migration, an outstanding characteristic of the United States, produces not only demographic effects, in that the age, sex, and race compositions of populations are materially influenced, but also gives rise to a number of effects on social organization, particularly on community, family, and individual adjustment. It is in the failure of individuals to orient themselves properly to new environments, especially in their failure to maintain or secure economic self-sufficiency, that transiency arises. Transiency is, in effect, the pathology of migration.

Motives for interstate and for intrastate migration are somewhat different. Desire for economic improvement prompts in large measure the movement of interstate transients; need for medical care impels to a considerable extent the intrastate migrants. Those who cross State borders in search of health do so, in the main, for pulmonary conditions, usually tuberculosis, which often lead them toward the Southwest and its reputedly salubrious climate.

Of those interviewed, about 70 percent of the families and 77 percent of the unattached had been migrants for less than 1 year, while among those who had been migrants for as long as 2 years, practically all of the family cases and more than nine-tenths of the unattached had lived in the State of interview 1 year or more. In view of these facts, it is probable that approximately three-fourths of the interstate transient group is made up of families and individuals who have not adopted for themselves a life of migration but who are in the process of relocation.

The means whereby legal discrimination against transients is effected lie in the so-called "poor laws," traceable to feudalism in England, which the majority of the States have among their statutes. Associated with them are laws relating to acquisitions of settlement, loss of settlement, and provision of relief for nonresidents. Peculiar to individual States, these laws are, on the whole, ill adapted to the existing economy. Furthermore, discrimination against the transient is inherent in the practices of public assistance agencies that grant social and medical care to transients. Almost half of all governmental as well as nongovernmental agencies in States with settlement laws have stricter settlement requirements than the law provides. Since it is true that almost two-thirds of the agencies giving medical care to transients restrict care to either emergency or selected cases,

the difficulties facing the transient who requires public medical care are at once apparent.

Transients, either interstate or intrastate, have considerably more disabling illness than persons who have resided in communities long enough and under such conditions as to have the status of residents. Intrastate transients have even higher disabling illness rates than have the interstate. It is possible that this difference is due to the greater proportionate migration of interstate transients to cities in search of public medical care which they do not believe is available to them at home in smaller communities. Among all interstate transients the most recent migrants have the least number of disabling illnesses and, as migration continues, the incidence of disabling illness increases. However, as illness strikes more frequently, the result seems to be that further migration is delayed and often the migrant settles down in some community and eventually becomes a resident. This tendency may be responsible for the high rate of illness and disease found in cities among the local homeless, many of whom may well be former interstate transients disabled for migration by chronic or recurring diseases.

Data on medical care received by transients reflect the results of the limitations imposed on the group. No class or type of transient, except special beneficiaries of the Federal health services, receives as much medical care as even the poor in resident groups. Although most students of the subject agree that care received by many residents is not adequate for the maintenance of health, transients receive even less care than do residents.

The influence of transients on community health can hardly be other than deleterious. As a result of grossly poor living conditions, a high incidence of typhoid fever and particularly of dysentery occurs among transients. Malnutrition appears to be common, diets for children being deficient to the extent that future health may be impaired. Dangers of introducing such diseases as smallpox, meningococcus meningitis, malaria, and trachoma are multiplied by an influx of transients. The discrimination noted against diseased transients in hospitals, sanatoria, and clinics undoubtedly has an economic basis. Estimates for the cost of public hospitalization now being supplied to transients in general hospitals show that an enormous load from this cause is being carried by some communities, in spite of the fact that transients generally receive considerably less medical care and hospitalization than do residents.

Specific recommendations as to the most equitable and practical solution of the medical problems involved in transiency follow: (1) Migration and transiency must be recognized as permanent characteristics of American society; (2) an organization of Federal level should be created to direct and influence migration; (3) through

the planned cooperation of the Federal and State Governments medical care should be provided for all needy persons, regardless of residence; (4) particular concentration of transients in a State should be considered a special health problem in the allotment of Federal funds for the maintenance and improvement of local public health facilities; and (5) the administration of any program of medical care for transients should be a function of the local agency responsible for the care of needy residents.

COURT DECISION ON PUBLIC HEALTH

Compensation under workmen's compensation act awarded for typhoid fever.—(New Jersey Supreme Court; *Bobertz* v. *Township of Hillside*, 15 A.2d 796; decided October 18, 1940.) A sewer inspector for Hillside Township, while making a routine inspection, found one of the sewers clogged and went down a manhole to effect a repair. He slipped on the step and his face and mouth were spattered with sewage. Within the incubation period he became ill with a virulent attack of typhoid fever. He sought, and the Supreme Court of New Jersey granted, compensation under the workmen's compensation act. The court said that there was no denial of the occurrence of the accident as related by the employee. It was also stated that it was too well demonstrated by the proofs to admit of doubt that sewage may contain typhoid fever germs and that human beings may be infected if germs reach the nose and mouth. No one else in the employee's family was infected with the disease, so that there was no reason to suppose that there was any home cause of infection.

DEATHS DURING WEEK ENDED NOVEMBER 30, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Nov. 30, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,341	8,536
Average for 3 prior years	8,716	
Total deaths, first 48 weeks of year	401,403	395,027
Deaths under 1 year of age	551	521
Average for 3 prior years	539	
Deaths under 1 year of age, first 48 weeks of year	24,143	23,836
Data from industrial insurance companies:		
Policies in force	64,822,543	66,535,899
Number of death claims	13,091	12,371
Death claims per 1,000 policies in force, annual rate	10.6	9.7
Death claims per 1,000 policies, first 48 weeks of year, annual rate	9.6	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 7, 1940

Summary

For the current week, 9,663 cases of influenza were reported by State health officers, as compared with 3,014 for the preceding week. This increase was accounted for in most part by the rise in California, where 6,772 cases were reported for the current week as compared with 1,490 for the preceding week. The disease is reported to be of mild form in California, with little or no increase in pneumonia deaths recorded in the cities.[1] The highest incidence is in the western and southern States, with the eastern and north central States reporting few cases.

Of the other 8 communicable diseases included in the following table, only measles, poliomyelitis and whooping cough were above the 5-year median (1935–39), and the cumulative totals for the current year to date are higher than the medians for only 2 of the 9 diseases—influenza and poliomyelitis.

Of a total of 50 cases of smallpox, 22 cases occurred in the West North Central States (18 in Minnesota), 15 in the East North Central group, and 8 cases in Oregon, while no cases were reported in the New England, Middle Atlantic, South Atlantic, or East South Central States.

Six cases of tularemia were reported in South Carolina, and of a total of 45 cases of endemic typhus fever, 14 occurred in Georgia and 12 in Texas.

For the current week the Bureau of the Census reports 8,565 deaths in 88 major cities of the United States, as compared with 8,341 for the preceding week and with a 3-year (1937–39) average of 8,654 for the corresponding week.

[1] See page 2303.

Telegraphic morbidity reports from State health officers for the week ended December 7, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Dec. 7, 1940	Dec. 9, 1939		Dec. 7, 1940	Dec. 9, 1939		Dec. 7, 1940	Dec. 9, 1939		Dec. 7, 1940	Dec. 9, 1939	
NEW ENG.												
Maine	1	1	2	2	10	1	54	40	40	0	0	0
New Hampshire	0	0	0	------	------	------	0	4	2	0	0	0
Vermont	0	0	0	------	------	------	24	23	21	0	0	0
Massachusetts	6	3	4	------	------	------	230	324	192	1	0	2
Rhode Island [1]	1	1	0	------	------	------	0	80	78	0	1	0
Connecticut	1	0	4	2	5	5	4	46	75	0	1	1
MID. ATL.												
New York	15	12	35	[2] 3	[2] 12	[2] 13	733	509	496	0	2	5
New Jersey	10	15	15	6	9	12	231	16	16	0	1	1
Pennsylvania	21	29	52	------	------	------	1,195	37	76	3	2	3
E. NO. CEN.												
Ohio	13	44	44	44	14	11	52	13	20	1	0	2
Indiana	9	24	24	1	12	33	20	8	14	0	3	3
Illinois	21	46	41	10	8	22	653	24	28	1	2	2
Michigan [1]	10	6	25	9	6	4	597	271	173	0	0	2
Wisconsin	0	1	3	69	------	27	242	52	68	0	0	0
W. NO. CEN.												
Minnesota	1	1	6	2	2	2	6	43	43	0	0	0
Iowa	2	11	8	3	15	3	46	10	6	2	0	0
Missouri	9	14	29	1	2	58	7	4	7	0	0	1
North Dakota	4	2	2	10	1	8	2	17	5	0	0	0
South Dakota	1	4	2	------	1	------	0	0	1	0	0	0
Nebraska	1	2	4	------	------	------	3	1	2	0	0	1
Kansas	4	4	15	14	10	10	32	96	14	0	1	1
SO. ATL.												
Delaware	0	0	1	------	------	------	7	2	3	1	0	0
Maryland [1]	1	7	19	6	12	13	4	6	20	1	2	2
Dist. of Col.	4	2	9	------	------	3	0	1	3	0	0	0
Virginia	26	55	55	166	132	------	69	24	30	0	0	5
West Virginia [1]	7	18	26	6	16	18	11	2	15	0	1	3
North Carolina [3]	15	102	73	6	25	7	20	139	139	2	2	2
South Carolina [3]	3	25	11	301	1,347	381	20	6	6	1	1	1
Georgia [3]	21	36	27	133	214	57	27	8	0	0	0	0
Florida	8	12	12	14	6	5	4	0	3	0	1	0
E. SO. CEN.												
Kentucky	3	22	22	5	6	15	114	3	6	0	0	3
Tennessee	11	22	27	20	22	59	21	28	13	1	2	2
Alabama [3]	17	38	29	42	466	130	12	14	14	0	1	2
Mississippi [1] [3]	5	24	12	------	------	------	------	------	------	1	1	0
W. SO. CEN.												
Arkansas	6	26	18	83	99	82	5	2	2	0	0	0
Louisiana [3]	10	8	28	32	7	7	1	0	1	2	0	0
Oklahoma	21	17	24	288	113	69	2	4	4	0	1	1
Texas [3]	55	45	67	370	443	368	64	43	43	1	1	6
MOUNTAIN												
Montana	12	1	2	12	684	6	6	19	11	0	0	0
Idaho	1	0	0	17	------	1	0	21	21	0	0	0
Wyoming	1	2	1	8	52	------	1	6	1	0	0	0
Colorado	6	11	9	23	116	------	28	17	9	0	1	1
New Mexico	1	5	5	6	------	------	21	1	5	0	0	0
Arizona	1	8	8	471	86	86	29	3	2	0	0	1
Utah [1]	0	2	1	243	296	4	8	52	23	0	0	0
Nevada	0	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	1	0	3	95	------	------	31	378	128	0	1	1
Oregon	1	1	1	368	57	23	15	34	14	2	2	1
California	26	31	31	6,772	19	37	84	134	134	2	0	1
Total	393	740	896	9,663	4,325	1,903	4,747	2,574	2,574	22	30	73
40 weeks	14,739	22,471	26,741	191,873	169,793	151,539	257,640	306,303	306,303	1,515	1,851	5,149

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 7, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–19	Week ended		Median, 1935–39
	Dec. 7, 1940	Dec. 9, 1939		Dec. 7, 1940	Dec. 9, 1939		Dec. 7, 1940	Dec. 9, 1939		Dec. 7, 1940	Dec. 9, 1939	
NEW ENG.												
Maine	0	1	0	19	8	11	0	0	0	4	0	2
New Hampshire	0	0	0	3	1	6	0	0	0	0	2	0
Vermont	0	0	0	2	6	14	0	0	0	0	0	0
Massachusetts	0	2	0	140	84	129	0	0	0	1	2	1
Rhode Island [1]	0	0	0	7	11	20	0	0	0	0	0	0
Connecticut	0	1	0	33	43	44	0	0	0	1	2	1
MID. ATL.												
New York	2	6	2	268	302	400	0	0	0	14	6	7
New Jersey	2	2	1	136	222	103	0	0	0	1	7	3
Pennsylvania	1	3	3	234	312	421	0	0	0	3	7	7
E. NO. CEN.												
Ohio	7	1	2	212	397	379	0	1	1	6	9	4
Indiana	5	1	0	114	138	181	1	3	3	4	1	2
Illinois	5	1	1	294	316	343	7	5	5	8	9	9
Michigan [1]	2	3	1	154	285	406	5	1	1	1	1	1
Wisconsin	17	3	1	146	101	197	2	6	6	2	0	1
W. NO. CEN.												
Minnesota	2	3	0	67	118	140	18	32	16	0	1	0
Iowa	4	9	1	102	62	92	3	10	10	1	0	0
Missouri	3	0	1	54	88	132	0	5	5	2	2	5
North Dakota	2	0	0	3	26	26	1	0	1	0	0	0
South Dakota	3	0	0	16	18	33	0	2	11	0	0	0
Nebraska	2	0	0	33	20	27	0	0	0	0	0	1
Kansas	1	2	0	82	128	153	0	0	5	3	3	2
SO. ATL.												
Delaware	0	1	0	12	22	12	0	0	0	0	1	1
Maryland [1]	0	2	0	39	50	68	0	0	0	1	6	5
Dist. of Col.	0	0	0	15	2	12	0	0	0	0	1	2
Virginia	5	1	1	52	69	55	0	0	0	5	2	4
West Virginia [1]	5	0	0	43	91	91	0	0	0	0	11	5
North Carolina [3]	1	0	1	105	113	87	0	1	0	2	5	4
South Carolina [3]	0	4	1	20	25	8	0	0	0	3	4	2
Georgia [3]	1	1	1	27	88	26	0	0	1	8	4	4
Florida	2	0	0	5	9	9	0	1	0	5	1	2
E. SO. CEN.												
Kentucky	3	10	1	96	68	68	0	0	0	4	3	3
Tennessee	0	0	2	51	75	45	0	0	0	7	7	7
Alabama [3]	1	0	0	35	50	30	0	0	0	5	0	2
Mississippi [1 3]	1	2	1	22	18	18	0	0	0	1	3	3
W. SO. CEN.												
Arkansas	0	2	1	13	16	16	1	2	2	2	3	3
Louisiana [3]	1	1	1	7	18	18	0	1	0	14	5	7
Oklahoma	1	1	1	20	18	23	0	6	3	1	7	7
Texas [3]	2	4	4	37	56	100	0	6	2	10	11	24
MOUNTAIN												
Montana	0	0	0	16	42	37	3	1	25	1	0	0
Idaho	0	1	0	12	10	33	0	0	1	0	1	2
Wyoming	0	0	0	7	16	16	0	0	0	0	0	0
Colorado	1	3	0	33	45	45	0	29	23	0	0	0
New Mexico	0	0	1	17	20	20	0	0	0	3	5	7
Arizona	0	0	0	4	8	8	0	0	0	0	3	0
Utah [1]	1	5	0	13	18	28	0	1	0	0	3	0
Nevada	0	------	------	0	------	------	0	------	------	1	------	------
PACIFIC												
Washington	3	0	1	35	29	67	0	0	3	1	5	2
Oregon	0	1	0	20	31	51	8	2	5	0	2	2
California	5	21	6	99	191	220	1	4	4	2	6	7
Total	91	98	68	2,974	3,834	4,468	50	119	199	127	151	151
49 weeks	9,600	7,125	7,125	146,519	151,214	209,505	2,292	9,280	9,280	9,286	12,416	14,135

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 7, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Whooping cough, week ended— Dec. 7, 1940	Whooping cough, week ended— Dec. 9, 1939
NEW ENG.		
Maine	66	53
New Hampshire	2	7
Vermont	7	57
Massachusetts	272	136
Rhode Island [1]	7	16
Connecticut	61	98
MID. ATL.		
New York	473	494
New Jersey	171	140
Pennsylvania	678	303
E. NO. CEN.		
Ohio	305	132
Indiana	13	63
Illinois	140	112
Michigan [1]	342	131
Wisconsin	161	110
W. NO. CEN.		
Minnesota	111	52
Iowa	27	55
Missouri	51	14
North Dakota	17	13
South Dakota	3	1
Nebraska	7	12
Kansas	121	27
SO. ATL.		
Delaware	30	16
Maryland [1]	81	55
Dist. of Col	14	10
Virginia	75	30
West Virginia [1]	33	14
North Carolina [3]	243	59
SO. ATL.—continued		
South Carolina [3]	23	12
Georgia [3]	26	20
Florida	9	2
E. SO. CEN.		
Kentucky	67	45
Tennessee	15	44
Alabama [3]	26	13
Mississippi [1] [3]	----------	----------
W. SO. CEN.		
Arkansas	14	5
Louisiana [3]	9	29
Oklahoma	17	1
Texas [3]	110	58
MOUNTAIN		
Montana	2	6
Idaho	8	0
Wyoming	4	12
Colorado	40	10
New Mexico	16	36
Arizona	19	2
Utah	24	95
Nevada	4	----------
PACIFIC		
Washington	62	17
Oregon	8	35
California	316	148
Total	4,339	2,839
49 weeks	150,619	165,667

[1] Period ended earlier than Saturday.
[2] New York City only.
[3] Typhus fever, week ended Dec. 7, 1940, 45 cases, as follows: North Carolina, 3; South Carlina, 2; Georgia, 14; Alabama, 6; Mississippi, 2; Louisiana, 6; Texas, 12.

VENEREAL DISEASES

New Cases Reported for September 1940[1]

Reports from States

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis[2]					
	Primary and secondary	Early-latent[3]	Rate per 10,000 population	Includes late-latent	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Alabama	281	265	1.93	281	0.99	57	0.20	1,426	5.04	419	1.48	13	0.05
Alaska	8	------	1.11	17	2.36	1	.14	26	3.61	44	6.11	------	------
Arizona	28	11	.78	41	.82	8	.16	161	3.23	127	2.55	9	.18
Arkansas	197	231	2.20	603	3.10	23	.12	1,211	6.22	153	.79	9	.05
California	221	369	.86	979	1.42	73	.11	1,730	2.52	1,948	2.83	31	.05
Colorado	62	------	.55	131	1.17	16	.14	209	1.87	108	.97	------	------
Connecticut	13	8	.12	118	.60	17	.10	174	1.02	133	.78	1	.01
Delaware	7	13	.75	23	.86	2	.08	155	5.82	44	1.65	------	------
District of Columbia	------	------	------	------	------	------	------	386	5.82	262	3.95	3	.05
Florida	181	231	2.18	563	2.98	36	.19	1,634	7.23	124	.66	10	.05
Georgia	------	1,122	3.60	561	1.80	------	------	1,683	5.39	84	.27	6	.02
Hawaii	9	1	.24	16	.38	7	.17	51	1.20	47	1.11	------	------
Idaho	17	------	.32	11	.21	1	.02	29	.55	18	.34	------	------
Illinois	147	309	.58	1,105	1.40	62	.08	1,623	2.06	1,656	2.10	39	.05
Indiana	83	42	.37	237	.69	29	.08	571	1.67	212	.62	------	------
Iowa	37	53	.35	107	.42	6	.02	209	.82	173	.68	------	------
Kansas	45	22	.37	57	.32	11	.06	194	1.08	169	.94	2	.01
Kentucky	62	31	.33	191	.67	12	.04	462	1.63	298	1.05	3	.01
Louisiana	310	2	1.32	10	.04	3	.01	734	3.11	145	.61	14	.06
Maine	16	------	.19	20	.24	3	.04	42	.50	17	.20	------	------
Maryland	89	25	.63	151	.83	21	.12	709	3.91	369	2.04	16	.09
Massachusetts	59	------	.14	310	.72	34	.08	403	.93	391	.91	------	------
Michigan	112	122	.45	411	.78	32	.06	802	1.53	803	1.53	21	.04
Minnesota	14	19	.12	161	.58	9	.03	203	.73	187	.67	------	------
Mississippi	198	557	3.46	747	3.42	113	.52	4,026	18.45	2,402	11.01	1	.004
Missouri	139	266	1.07	225	.60	21	.06	674	1.79	305	.81	8	.02
Montana	10	------	.18	16	.29	1	.02	36	.65	34	.61	------	------
Nebraska	35	5	.30	39	.30	3	.02	82	.62	103	.78	------	------
Nevada	1	11	1.09	7	.64	11	1.00	30	2.73	13	1.18	------	------
New Hampshire	1	2	.06	12	.24	2	.04	20	.41	10	.20	------	------
New Jersey	105	162	.64	497	1.20	49	.12	823	1.98	337	.81	51	.12
New Mexico	14	9	.44	51	.96	1	.02	78	1.48	36	.68	1	.02
New York	249	389	.48	2,280	1.70	137	.10	3,294	2.46	1,803	1.35	77	.06
North Carolina	181	631	2.28	425	1.19	86	.24	1,323	3.71	519	1.46	34	.10
North Dakota	6	8	.22	8	.13	------	------	26	.41	43	.67	------	------
Ohio	229	257	.71	793	1.15	62	.09	1,341	1.95	160	.23	4	.01
Oklahoma	117	180	1.27	152	.65	21	.09	702	3.01	403	1.73	------	------
Oregon	35	22	.52	49	.45	4	.04	112	1.03	111	1.02	------	------
Pennsylvania	194	364	.56	502	.51	63	.06	1,123	1.14	------	------	------	------
Rhode Island	9	10	.27	44	.62	5	.07	71	1.00	37	.52	------	------
South Carolina	531	311	4.42	434	2.28	25	.13	1,339	7.03	59	.31	1	.01
South Dakota	31	14	.70	13	.20	4	.06	62	.97	32	.50	------	------
Tennessee	257	502	2.60	717	2.46	45	.15	1,523	5.23	402	1.38	17	.06
Texas	368	596	1.50	926	1.44	98	.15	2,185	3.40	885	1.38	45	.07
Utah	12	7	.35	50	.91	11	.20	81	1.48	53	.97	1	.02
Vermont	4	10	.39	4	.11	2	.06	20	.56	21	.58	------	------
Virginia	444	421	3.25	710	2.66	51	.19	1,724	6.47	280	1.05	------	------
Washington	34	40	.43	158	.92	7	.04	264	1.53	479	2.78	4	.02
West Virginia	91	69	.84	90	.47	22	.12	526	2.77	224	1.18	------	------
Wisconsin	20	2	.07	101	.32	4	.01	127	.41	114	.36	------	------
Wyoming	7	6	.53	18	.73	1	.04	36	1.46	30	1.22	1	.04
Puerto Rico[4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Virgin Islands[4]	------	------	------	------	------	------	------	------	------	------	------	------	------
Total	5,320	7,727	.99	15,172	1.16	1,312	.10	36,205	2.75	16,826	1.28	422	.03

See footnotes at end of table.

Reports from cities of 200,000 population or over

	Syphilis									Gonorrhea		Other venereal diseases	
	Early			Late		Congenital		All syphilis[1]					
	Primary and secondary	Early-latent[3]	Rate per 10,000 population	Includes late-latent	Rate per 10,000 popuation	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population	Number	Rate per 10,000 population
Akron	11	6	0.70	29	1.19	8	0.12	49	2.02	6	0.25	-----	-----
Atlanta	-----	301	9.95	76	2.51	-----	-----	377	12.46	44	1.45	-----	-----
Baltimore	77	8	1.00	111	1.30	5	.06	446	5.22	257	3.01	15	0.18
Birmingham	77	11	3.33	25	.95	4	.15	357	13.51	60	2.27	-----	-----
Boston[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Buffalo	20	-----	.35	109	1.90	4	.07	133	2.31	86	1.50	-----	-----
Chicago	91	157	.73	700	2.25	28	.08	936	2.77	1,107	3.27	37	.11
Cincinnati[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Cleveland	25	52	.88	170	1.94	17	.19	264	3.01	156	1.78	1	.01
Columbus	14	21	1.15	62	2.03	5	.16	102	3.34	26	.85	-----	-----
Dallas	48	44	3.14	100	3.41	4	.14	196	6.68	152	5.18	24	.82
Dayton	13	8	.99	46	2.18	4	.19	71	3.36	32	1.51	1	.05
Denver	29	13	1.32	72	2.26	8	.25	124	3.89	74	2.32	-----	-----
Detroit	41	60	.62	272	1.68	9	.06	382	2.36	357	2.21	16	.10
Houston[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Indianapolis	13	2	.39	17	.44	4	.10	117	3.03	57	1.48	-----	-----
Jersey City	8	6	.47	20	.66	-----	-----	36	1.20	11	.37	-----	-----
Kansas City[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Los Angeles	-----	183	1.22	359	2.40	19	.13	561	3.75	494	3.30	6	.04
Louisville	7	3	.31	70	2.20	4	.13	134	4.20	68	2.13	-----	-----
Memphis[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Milwaukee	5	11	.27	44	.75	1	.02	61	1.03	28	.47	28	.47
Minneapolis	1	3	.08	24	.49	-----	-----	28	.57	51	1.04	-----	-----
Newark	6	22	.65	136	3.18	23	.54	187	4.37	61	1.42	-----	-----
New Orleans[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
New York	249	305	.75	1,391	1.88	83	.11	2,255	3.06	1,325	1.80	85	.12
Oakland	21	16	1.21	90	2.95	6	.20	133	4.36	137	4.49	3	.10
Omaha	25	4	1.30	11	.49	1	.04	41	1.84	25	1.12	-----	-----
Philadelphia[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pittsburgh[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Portland	6	11	.55	23	.75	2	.07	42	1.37	61	1.98	-----	-----
Providence	6	2	.32	26	1.03	1	.04	35	1.38	20	.79	-----	-----
Rochester	-----	-----	-----	24	.74	-----	-----	24	.74	32	.99	-----	-----
St. Louis	34	181	2.64	317	3.90	16	.20	550	6.76	246	3.02	7	.09
St. Paul	3	4	.24	17	.59	3	.10	27	.94	27	.94	-----	-----
San Antonio	12	32	1.74	99	3.91	21	.83	173	6.83	61	2.41	1	.04
San Francisco	33	35	1.08	107	1.70	8	.13	183	2.91	247	3.92	11	.17
Seattle	18	11	.79	73	1.99	1	.03	117	3.19	190	5.18	5	.14
Syracuse	-----	-----	-----	60	2.92	6	.29	66	3.21	8	.39	-----	-----
Toledo	6	4	.36	34	1.21	3	.12	47	1.67	47	1.67	-----	-----
Washington	-----	-----	-----	-----	-----	-----	-----	386	5.82	262	3.95	3	.05
Total	899	1,516	.97	4,774	1.92	293	.11	8,040	3.38	5,815	2.28	243	.12

[1] Figures preliminary and subject to correction; rates based on 1940 census populations.
[2] Includes "not stated" diagnosis.
[3] Duration of infection under 4 years.
[4] No report for current month.

WEEKLY REPORTS FROM CITIES

City reports for week ended November 23, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	197	127	39	660	521	1,031	8	326	32	1,040	--------
Current week	64	86	24	1,409	341	660	2	284	33	1,314	--------
Maine: Portland	0	------	0	0	0	0	0	0	0	15	14
New Hampshire:											
Concord	0	------	0	0	1	1	0	0	0	0	11
Manchester	0	------	0	0	2	4	0	1	0	0	20
Nashua	0	------	0	0	0	1	0	0	0	0	7
Vermont:											
Barre	0	------	0	0	1	0	0	0	0	0	4
Burlington	0	------	0	0	0	0	0	0	0	0	8
Rutland	0	------	0	0	0	0	0	0	0	0	12
Massachusetts:											
Boston	0	------	1	47	17	26	0	3	3	107	213
Fall River	1	------	0	0	1	2	0	0	0	3	26
Springfield	0	------	0	0	0	4	0	0	0	1	38
Worcester	0	------	0	101	3	6	0	1	0	0	41
Rhode Island:											
Pawtucket	1	------	0	0	0	0	0	0	0	0	15
Providence	1	------	0	0	1	2	0	2	0	5	53
Connecticut:											
Bridgeport	0	1	1	0	2	3	0	0	2	1	32
Hartford	0	------	0	1	2	5	0	2	0	5	44
New Haven	0	------	0	0	4	5	0	0	0	31	44
New York:											
Buffalo	0	------	1	10	3	11	0	2	0	14	130
New York	14	1	1	304	50	50	0	66	5	127	1,372
Rochester	0	------	0	2	3	0	0	1	0	24	57
Syracuse	0	------	0	0	3	2	0	0	0	8	31
New Jersey:											
Camden	0	------	0	46	0	4	0	2	0	8	34
Newark	0	2	0	16	3	19	0	5	0	19	82
Trenton	0	1	0	1	3	0	0	5	0	0	30
Pennsylvania:											
Philadelphia	3	------	1	244	14	53	0	20	2	116	413
Pittsburgh	0	2	1	3	10	11	0	7	2	32	178
Reading	0	------	0	10	0	0	0	0	0	34	16
Scranton	0	------	--------	0	-------	1	0	-------	0	0	--------
Ohio:											
Cincinnati	0	1	0	0	5	20	0	4	0	3	125
Cleveland	0	14	1	5	12	20	0	4	0	71	211
Columbus	0	1	1	0	1	8	0	1	0	21	65
Toledo	0	------	0	1	3	13	0	2	0	8	54
Indiana:											
Anderson	0	------	0	0	0	1	0	0	0	0	12
Fort Wayne	0	------	0	0	1	0	0	1	0	0	25
Indianapolis	1	------	1	0	8	15	0	3	0	13	108
Muncie	0	------	0	0	0	4	0	0	0	0	11
South Bend	0	------	0	0	2	1	0	0	0	0	15
Terre Haute	0	------	1	1	0	0	0	0	0	0	11
Illinois:											
Alton	0	------	0	0	1	3	0	0	0	0	11
Chicago	12	3	3	259	24	132	0	25	0	92	663
Elgin	0	------	0	0	3	0	0	0	0	0	14
Moline	0	------	0	0	0	1	0	0	0	1	8
Springfield	0	------	0	0	1	7	1	0	0	1	22
Michigan:											
Detroit	5	------	1	196	17	61	0	17	0	107	253
Flint	0	------	0	0	1	2	0	0	0	4	26
Grand Rapids	0	------	1	0	0	7	0	0	0	24	29
Wisconsin:											
Kenosha	0	------	0	0	0	0	0	0	0	0	6
Madison	0	------	0	5	0	2	0	0	0	4	21
Milwaukee	1	------	0	15	2	22	0	1	0	17	85
Racine	0	------	0	2	0	5	0	0	0	2	13
Superior	0	------	0	1	0	4	0	0	0	3	5
Minnesota:											
Duluth	0	------	0	0	3	3	1	0	0	12	22
Minneapolis	0	------	0	1	4	21	0	0	0	26	92
St. Paul	0	------	0	1	7	8	0	1	0	18	67

City reports for week ended November 23, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	------	------	1	------	5	0	------	0	0	------
Davenport	0	------	------	0	------	2	0	------	0	0	------
Des Moines	2	------	0	1	0	6	0	0	0	1	35
Sioux City	0	------	------	1	------	2	0	------	0	1	------
Waterloo	2	------	------	0	------	2	0	------	0	0	------
Missouri:											
Kansas City	0	------	0	0	4	4	0	3	0	48	97
St. Joseph	1	------	1	0	5	0	0	1	0	2	25
St. Louis	2	------	0	2	8	12	0	12	2	16	202
North Dakota:											
Fargo	0	------	0	0	1	3	0	0	0	0	10
Grand Forks	0	------	------	0	------	1	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	2
South Dakota:											
Aberdeen	0	------	------	0	------	2	0	------	0	0	------
Sioux Falls	0	------	0	0	0	5	0	0	0	0	9
Nebraska:											
Lincoln	0	------	------	0	------	1	0	------	0	1	------
Omaha	0	------	0	0	1	1	0	1	0	1	53
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	1	3	4
Topeka	0	------	0	0	0	5	0	0	0	3	17
Wichita	0	------	0	1	2	2	0	2	1	25	23
Delaware:											
Wilmington	0	------	0	1	1	0	0	0	0	9	13
Maryland:											
Baltimore	0	1	0	3	11	17	0	1	0	15	198
Cumberland	0	------	0	0	0	0	0	0	0	0	14
Frederick	0	------	0	0	0	0	0	0	0	0	2
Dist. of Col.:											
Washington	1	1	0	3	12	8	0	9	0	9	164
Virginia:											
Lynchburg	0	------	0	0	3	0	0	0	0	1	13
Norfolk	0	------	0	1	0	1	0	0	0	7	19
Richmond	0	------	0	0	3	9	0	1	2	0	43
Roanoke	1	------	0	5	1	0	0	0	0	5	16
West Virginia:											
Charleston	0	------	------	0	------	0	0	------	0	0	------
Huntington	0	------	------	0	------	0	0	------	0	0	------
Wheeling	0	------	0	0	2	0	0	0	0	3	32
North Carolina:											
Gastonia	0	------	------	0	------	1	0	------	0	4	------
Raleigh	0	------	0	0	0	0	0	0	0	5	20
Wilmington	2	------	0	1	0	0	0	0	0	0	11
Winston-Salem	1	------	0	0	2	1	0	1	0	38	16
South Carolina:											
Charleston	0	14	0	1	0	2	0	1	0	0	15
Florence	1	13	0	0	1	0	0	0	0	0	7
Greenville	0	------	0	0	2	1	0	0	0	1	22
Georgia:											
Atlanta	3	------	0	1	1	7	0	2	0	2	62
Brunswick	0	------	0	0	0	0	0	0	0	4	6
Savannah	0	5	0	0	0	1	0	2	2	0	31
Florida:											
Miami	0	------	0	1	1	1	0	0	0	0	36
Tampa	1	------	0	0	0	2	0	1	0	0	19
Kentucky:											
Ashland	0	3	0	0	0	1	0	0	0	0	4
Covington	1	------	0	2	0	2	0	2	0	0	10
Lexington	0	------	0	48	0	0	0	1	0	6	14
Louisville	0	1	0	------	3	11	0	3	0	8	66
Tennessee:											
Knoxville	2	2	0	0	3	0	0	0	0	0	27
Memphis	0	------	0	8	3	6	0	8	0	7	99
Nashville	0	------	1	0	4	4	0	2	0	8	56
Alabama:											
Birmingham	1	1	0	6	7	1	0	3	1	1	65
Mobile	0	1	0	0	1	3	0	2	0	0	23
Montgomery	0	------	------	0	------	0	0	------	0	0	------
Arkansas:											
Fort Smith	0	------	------	1	------	0	0	------	0	0	------
Little Rock	0	1	1	0	5	0	0	1	0	0	33
Louisiana:											
Lake Charles	0	------	0	0	0	2	0	0	0	0	6
New Orleans	0	4	3	0	13	0	0	15	0	0	160
Shreveport	2	------	0	0	3	0	0	2	1	0	35

City reports for week ended November 23, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Oklahoma:											
Oklahoma City	2	4	1	0	5	1	0	2	0	0	48
Tulsa	3	------	0	0	1	1	0	1	0	10	19
Texas:											
Dallas	2	1	0	0	3	4	0	2	0	0	60
Fort Worth	0	------	1	9	1	3	0	3	0	0	42
Galveston	0	------	0	0	0	0	0	0	0	0	20
Houston	2	------	1	0	2	0	0	7	0	0	57
San Antonio	1	------	0	0	2	0	0	5	0	0	66
Montana:											
Billings	1	------	0	2	3	0	0	0	0	0	10
Great Falls	0	------	0	0	4	1	0	0	0	1	14
Helena	0	------	0	0	0	0	0	0	0	0	3
Missoula	0	1	0	0	0	1	0	0	0	0	10
Idaho:											
Boise	0	------	0	0	0	1	0	0	0	0	4
Colorado:											
Colorado Springs	0	------	0	2	0	2	0	3	0	1	18
Denver	2	------	0	6	5	4	0	6	1	4	97
Pueblo	0	------	0	2	3	3	0	0	0	0	9
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	0	0	1	11
Utah:											
Salt Lake City	0	------	0	0	4	0	0	1	0	7	28
Washington:											
Seattle	0	------	0	1	1	0	0	1	1	6	84
Spokane	0	------	2	0	2	2	0	0	0	4	34
Tacoma	0	------	0	0	0	1	0	2	0	2	35
Oregon:											
Portland	1	1	0	0	4	3	0	0	0	2	81
Salem	0	------	------	0	------	0	0	------	0	0	------
California:											
Los Angeles	2	29	0	4	6	18	0	12	1	65	347
Sacramento	1	------	0	0	1	0	0	3	0	2	27
San Francisco	0	2	0	1	4	3	0	5	2	64	177

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Rhode Island:				Missouri:			
Pawtucket	1	0	0	Kansas City	0	0	2
New York:				St. Joseph	1	0	0
New York	0	1	1	North Dakota:			
New Jersey:				Fargo	0	0	4
Newark	1	0	0	Nebraska:			
Pennsylvania:				Omaha	0	0	1
Philadelphia	0	0	1	Kansas:			
Ohio:				Topeka	0	0	1
Cincinnati	0	0	1	South Carolina:			
Cleveland	0	0	3	Florence	0	1	0
Indiana:				Tennessee:			
Indianapolis	0	0	1	Knoxville	0	0	1
Illinois:				Montana:			
Chicago	0	0	9	Great Falls	0	0	1
Springfield	0	0	1	Colorado:			
Michigan:				Denver	1	0	1
Detroit	0	1	0	California:			
Minnesota:				Los Angeles	0	0	1
Minneapolis	0	0	3				
Iowa:							
Waterloo	0	0	1				

Encephalitis, epidemic or lethargic.—Cases: Springfield, Mass., 1; New York, 1.
Pellagra.—Cases: Winston-Salem, 1; Charleston, S. C., 1; Savannah, 1; Galveston, 1.
Typhus fever.—Cases: New York, 2; Raleigh, 2; Atlanta, 2; Savannah, 1; Tampa, 1; Covington, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 9, 1940.—During the week ended November 9, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				1	3				1	5
Chickenpox		11	8	149	311	37	38	128	81	763
Diphtheria		4	2	20	1	5	2	5		48
Dysentery				2						2
Influenza		16			96				96	208
Measles		82	1	23	170	55	57	46	36	470
Mumps				18	41	11	2	17	5	94
Pneumonia		4			26	2	1		7	40
Poliomyelitis				1			1			2
Scarlet fever		1	5	171	100	14	19	23	29	362
Smallpox							1			1
Trachoma									1	1
Tuberculosis	1	7	6	61	31	8	22	1		137
Typhoid and paratyphoid fever				18			1		2	21
Whooping cough		6	3	222	151	30	9	14	26	461

SWITZERLAND

Notifiable diseases—July 1940.—During the month of July 1940, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	34	Mumps	43
Chickenpox	103	Paratyphoid fever	8
Diphtheria and croup	33	Poliomyelitis	22
Dysentery	1	Scarlet fever	336
German measles	43	Tuberculosis	311
Lethargic encephalitis	2	Typhoid fever	7
Malaria	1	Undulant fever	18
Measles	623	Whooping cough	323

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of November 29, 1940, pages 2246–2249. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Yellow Fever

Belgian Congo—Yatolet.—On November 21, 1940, 1 case of yellow fever was reported at Yatolet, near Opala, south Stanleyville, Belgian Congo.

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Public Health Reports

VOLUME 55 **DECEMBER 20, 1940** NUMBER 51

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

In contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

PREVALENCE OF DISEASE

Public Health Reports

Vol. 55 • DECEMBER 20, 1940 • *No. 51*

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

November 3-30, 1940

The accompanying table summarizes the prevalence of eight important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended November 30, 1940, the number reported for the corresponding period in 1939, and the median number for the years 1935-39.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—For the 4 weeks ended November 30 there were 6,313 cases of influenza reported, as compared with 3,286 cases for the preceding 4-week period. The cases for the corresponding period in 1939, 1938, and 1937 totaled 7,581, 4,905, and 4,495, respectively. Only the expected seasonal rise of the disease appeared to have occurred in practically all regions except the Mountain and Pacific regions. Arizona, with 607 cases for the 4 weeks, seemed to be mostly responsible for the excess in the Mountain region and California reported 2,121 of the 2,239 cases occurring in the Pacific region.

Reports for the week ended December 7 [1] give a total of 9,663 cases for the week, of which California reported 6,772, Arizona 471, Oregon 368, and Utah 243 cases; more than 80 percent of the cases were reported from those 4 States. While it is likely that the outbreak will spread into other regions, reports for the week ended December 7 do not indicate that it has yet reached any of the other States

Mortality records indicate that the cases thus far have been of a mild type, as the death rate in large cities for the current period was about the same as in nonepidemic years.

Measles.—The incidence of measles, as compared with the corresponding period in 1939 and also with the 1935-39 median incidence, was considerably higher in the Middle Atlantic, East North Central, and South Central regions, but all other regions reported a relatively

[1] See pp 2359 and 2361 for later reports.

low incidence. For the country as a whole the number of cases reported (13,381) was about 80 percent in excess of last year's figure for this period, and also of the 1935–39 median incidence which is represented by the 1939 figure (7,479 cases).

Poliomyelitis.—A further decline of poliomyelitis continued through the month of November, the number of cases dropping from 1,781 for the preceding 4-week period to 796 for the 4 weeks ended November 30. The incidence was, however, approximately 40 percent in excess of that reported for the corresponding period in 1939 and more than 55 percent in excess of the 1935–39 median figure for the period. In the North Central regions the number of cases for the current period was still more than four times the average seasonal incidence and in the South Atlantic region the number of cases was almost 3 times the 1935–39 median incidence for the period. Other sections of the country, not affected by the recent rise, reported about the normal incidence for this season of the year.

Number of reported cases of 8 communicable diseases in the United States during the 4-week period Nov. 3–30, 1940, the number for the corresponding period in 1939, and the median number of cases reported for the corresponding period 1935–39 [1]

Division	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median	Current period	1939	5-year median
	Diphtheria			Influenza [2]			Measles [3]			Meningococcus meningitis		
United States [1]	1,714	3,074	3,676	6,313	7,581	4,495	13,381	7,479	7,479	88	132	279
New England	17	48	53	16	11	24	1,494	1,481	1,016	11	3	9
Middle Atlantic	153	333	333	27	74	79	5,543	1,024	1,710	17	29	39
East North Central	277	450	631	247	285	285	4,227	972	835	15	11	35
West North Central	95	152	313	53	71	168	447	948	618	7	8	21
South Atlantic	492	1,036	1,036	1,537	3,838	1,233	367	641	641	14	26	49
East South Central	222	398	435	206	857	468	571	96	124	10	19	31
West South Central	293	447	514	1,183	1,535	1,400	131	173	173	4	17	17
Mountain	60	67	98	715	766	278	341	552	562	1	9	9
Pacific	105	143	214	2,239	144	199	200	1,892	1,722	3	10	20
	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
United States [1]	796	576	509	10,005	13,626	14,695	128	198	494	578	735	947
New England	5	10	10	654	475	830	0	0	0	14	14	24
Middle Atlantic	48	132	46	1,744	2,644	2,677	0	0	0	104	103	119
East North Central	356	72	60	3,002	4,428	4,919	45	59	65	55	77	96
West North Central	142	98	49	1,223	1,746	2,246	26	95	176	32	48	78
South Atlantic	114	43	43	1,233	1,593	1,413	1	3	3	108	151	151
East South Central	35	42	36	828	902	758	11	1	9	80	50	77
West South Central	33	27	27	348	458	476	19	23	22	105	159	181
Mountain	27	55	15	405	485	799	4	9	84	44	32	70
Pacific	36	97	63	508	895	1,174	22	8	64	36	101	50

[1] 48 States and the District of Columbia.
[2] Mississippi, New York, and Pennsylvania excluded; New York City included.
[3] Mississippi excluded.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended November 30 there were 1,714 cases of diphtheria reported, as compared with 3,074, 3,570, and 3,676 cases for the corresponding period in 1939, 1938, and 1937, respectively. All sections of the country reported a very significant decline from the 1935–39 average incidence for this period.

Meningococcus meningitis.—The number of cases (88) of meningococcus meningitis reported was the lowest recorded for this period in the 12 years for which these data are available. The incidence was relatively low in all sections of the country except the New England, where the number of cases (11) was almost four times the number reported last year and was also slightly above the seasonal expectancy.

Scarlet fever.—Although the usual seasonal increase in scarlet fever was apparent in most sections of the country, the number of cases (10,005) reported for the current period was only about 73 percent of the number reported for the corresponding period in 1939 and less than 70 percent of the 1935–39 median figure for the period. The situation was favorable in all sections of the country. In the New England region the number of cases was slightly higher than the incidence in 1939, but was well below the preceding 5-year average incidence.

Smallpox.—The incidence of smallpox was the lowest on record for this period. The reported cases totaled 128, as compared with 198, 494, and 910 cases for the corresponding period in 1939, 1938, and 1937, respectively. In the East South Central region the number of cases stood at about the normal seasonal level, but in all other regions the incidence was relatively low.

Typhoid fever.—In relation to preceding years the incidence of typhoid fever remained low, the current incidence (578 cases) being less than 80 percent of the number of cases reported in 1939 and about 60 percent of the 1935–39 median figure for the corresponding period. In the East South Central region the number of cases stood at about the average seasonal level, but in all other regions the incidence was below the seasonal expectancy.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended November 30, based on data received from the Bureau of the Census, was about normal for this season of the year. The current rate was 11.4, as compared with 11.3 in 1939 and also an average of 11.3 in the years 1935–39.

A RECOMMENDED PROCEDURE FOR THE MOUSE PROTECTION TEST IN EVALUATION OF ANTIMENINGOCOCCUS SERUM[1]

By SARA E. BRANHAM, *Senior Bacteriologist*, and MARGARET PITTMAN, *Associate Bacteriologist, United States Public Health Service*

It is agreed generally that the present standard method of evaluation of antimeningococcus serum is unsatisfactory. Although the complete correlation of clinical results with any method of standardization must await the test of time, indications are that the mouse protection test gives a better criterion of the value of a serum than the *in vitro* methods usually employed. Those who have worked with the mouse protection test agree that a uniform technique is desirable if results are to be compared.

The many variable factors in the mouse protection test have been made the subject of detailed study by Pittman (*1*). The procedures recommended in the present paper are based on experiments done by the authors as well as by others during the past few years.

Our recommendation of this technique does not constitute official adoption at this time. It is being given now for trial with the hope that, if it proves satisfactory, another year may see its adoption.

DESCRIPTION OF TECHNIQUE

Since most polyvalent antimeningococcus sera contain mouse protective antibodies for Group I meningococci almost exclusively, the following method for the evaluation of protective antibodies for this immunological group is described. Application of this technique to the study of Group II mouse protective antibodies will be discussed later.

Culture.—It is essential to employ cultures that are of maximum virulence for mice. "Maximum virulence" means that 2 to 10 microorganisms can kill a mouse. The protective action of Group I antibodies is qualitatively the same upon all strains of this group. Nevertheless individual strains vary quantitatively in their response to the serum. For this reason one strain of proved suitability has been used for routine purposes. This strain, 1027 (I), isolated from a fatal case of meningitis, was received from Dr. C. P. Miller in 1937.

The culture is maintained by transfer every 24 or 48 hours on 5 percent rabbit blood agar. Apparently serum glucose agar can be used instead of the blood agar. To insure maximum virulence the culture is passed through a mouse every week or every other week. It is recovered from the peritoneal fluid of the mouse. The culture is also kept in a lyophile state. Before the latter can be used in pro-

[1] From the Division of Biologics Control, National Institute of Health.

tection tests it must have several rapid transfers (i. e., twice daily) on blood agar.

For the protection test a 5-hour blood agar culture, made from one which is itself not more than 24 hours old, is used. The culture is suspended in neopeptone solution (1 percent neopeptone and 0.5 percent NaCl) and adjusted to a density corresponding to 500 parts per million of silica (*2*). This suspension contains approximately 1,000,000,000 meningococci per cc. and is designated as 5×10^{-1}. Serial dilutions with an increment of 10 are prepared in the peptone solution. The suspensions that are to be given to the mice, i. e., the test dilution and those used for virulence titration, are prepared in mucin. In order to prevent diluting the mucin, the dilutions preceding those to be given to mice should also be made in mucin. The procedure is illustrated in the following example:

Neopeptone solution	*Mucin*	*Mucin suspension for mice*
5×10^{-1}		
5×10^{-2} ⟶	5×10^{-3} ⟶	5×10^{-4}
5×10^{-3}		
5×10^{-4}		
5×10^{-5} ⟶	5×10^{-6} ⟶	5×10^{-7}, 5×10^{-8}, 5×10^{-9}

The actual dilution used for the test dose depends on certain factors which will be discussed later.

Mucin.—Granular mucin[2] is selected on the basis of minimum toxicity for meningococci and for mice (*1*). Various lot numbers of mucin vary greatly in suitability for the test.

The actual concentration of mucin will vary under certain conditions which will be discussed below. Assuming that a 4-percent suspension is desired, the preparation is: Forty grams of mucin and 5 grams of NaCl are placed in a 2-liter flask. Nine hundred and ninety cc. of distilled water are added in small amounts with vigorous shaking between additions. This process requires about 30 minutes. The flask is placed in an ice box overnight to insure thorough dispersion of the particles of mucin. Next morning, after preliminary warming in a water bath, the suspension of mucin is autoclaved for 30 minutes at 15 pounds pressure (121° C.). It is then stored in an ice box for 2 weeks. During this time toxicity which may follow sterilization usually disappears. After this time 10 cc. of a sterile 50-percent glucose solution are added to give a 0.5-percent concentration, and the pH is adjusted to 7.3 to 7.4 with sodium hydroxide. The mucin is now ready for use.

Serum.—The most convenient number of serums to include in one test is four—three of unknown value and the control serum. This number can be handled easily within the time intervals that have been adopted and too long a period of standing for the culture suspension is avoided. The serum dilutions are made with an increment of 2

[2] Wilson Laboratories, Chicago, Ill

using 0.85 percent NaCl as a diluent. For the present control serum the dilutions used are 1:50, 1:100, 1:200, and 1:400. For the unknown sera the dilutions to be used are determined by preliminary plate precipitation tests in which the amount of precipitate produced with these is compared with the amount produced with the control serum. Details of this technique are described below.

Mice.—The most important factor in selecting mice is the choice of a pure line strain which is kept closely inbred. The sex distribution and weight of the mice are also important factors and have been discussed in detail by Pittman (*1*). In any given test it is desirable to use either one sex only, or else an equal number of each sex uniformly distributed. A range in weight not greater than 4 grams, and preferably not greater than 2 grams, is used. In our tests mice between 16 and 18 grams are usually employed.

With the pure line inbred mice, carefully selected according to sex and weight, it has been possible to use as few as 24 mice for each serum in a single test. This gives 6 mice for each of the 4 dilutions. Three additional mice are used for each of the 3 highest dilutions of culture in mucin which are used to determine the virulence of the strain.

Procedure.—The serum dilutions, prepared as described above, are inoculated intraperitoneally into the mice, using a 26-gauge needle. The amount given is 0.5 cc. It is our custom to administer the serum in order of highest to lowest dilution, thus making it possible to use one syringe for a single serum.

One hour after the beginning of the serum injection, the inoculation of the mucin suspension of culture (i. e., 5×10^{-4}) is begun. The inoculum of 1 cc. is given through a 23-gauge needle.

As a precaution against contamination the culture suspension, prepared in one flask, is distributed into four small containers (1 for each serum). A fresh sterile syringe is taken for each.

Following the inoculation of the test dose of culture (i. e., 5×10^{-4}) the control mice are given the dilutions prepared for virulence titration, i. e., 5×10^{-7}, 5×10^{-8}, and 5×10^{-9}.

The mice are all kept under observation for 96 hours. All mice that die during this time are autopsied and a smear stained by Gram's method made from the peritoneal exudate in order to ascertain whether the mice actually died from meningococcus infection or whether they succumbed to a secondary invader or to some other cause. Only those fatalities definitely attributable to meningococci are included in our calculations. A test is considered unsatisfactory if less than 50 percent of the mice receiving the lowest dilution survive or if more than 50 percent of those receiving the highest dilution survive. Two satisfactory tests are made with each serum on different days.

Evaluation of results.—Evaluation of results is made on the basis of the Reed-Muench method (*3*) in which the protective value is

determined from the dilution of serum which protects 50 percent of all mice used. This method of calculation is illustrated in the protocol given in table 1. The experiment included unknown sera A, B, and C, together with control serum M19. The 4 dilutions were selected on the basis of their plate precipitation reactions which are shown in table 2. The numbers of mice which died or survived on each dilution are given in columns 3 and 4. As was pointed out by Reed and Muench, those mice which survived when given a certain serum dilution would probably have survived also with lower dilutions. Therefore, in column 5 the survivals are accumulated beginning with the highest dilution. Conversely, the deaths are accumulated in column 6, beginning with the lowest dilution. The percentage of survivals for each dilution is recorded in column 7. In column 8 are recorded the dilutions of the sera which theoretically would have allowed 50 percent of the mice to survive. To explain how this endpoint is determined serum A may be taken as an example. In this case the endpoint lies between dilutions 1:50 and 1:100. We see that 75 percent of the mice survived at dilution 1:50 and 25 percent at dilution 1:100. The desired 50-percent endpoint would then be 25/50 or 0.5 of the distance between 1:50 and 1:100. Since the serum dilutions are in geometrical progression this point may be obtained by use of the formula given in a previous paper, or, more simply, by the graphic method described by Reed and Muench (*3*) and illustrated in figure 1.

TABLE 1.—*Determination of the mouse protective value (Group I) of 3 antimeningococcus sera*

Serum	Dilution	Survived	Died	Accumulation of			Calculated 50 percent endpoint	Relation to control			Units
				Survivals	Deaths	Percent survived		No. 1	No. 2	Mean	
								Percent	*Percent*	*Percent*	
A	1:25	5	0	11	0	100	1:71	50	52	51	330
	1:50	4	2	6	2	75					
	1:100	2	4	2	6	25					
	1:200	0	6	0	12	0					
M19	1:50	5	1	12	1	92	1:145	100	100	100	650
	1:100	6	0	7	1	88					
	1:200	1	5	1	6	14					
	1:400	0	6	0	12	0					
B	1:50	5	1	12	1	92	1:147	101	99	100	650
	1:100	4	2	7	3	70					
	1:200	3	3	3	6	33					
	1·400	0	6	0	12	0					
C	1:100	5	0	13	0	100	1:360	248	234	241	1,500
	1:200	5	1	8	1	89					
	1:400	3	3	3	4	43					
	1:800	0	6	0	10	0					

Male mice and 3.5 percent mucin were used.

Semilogarithmic paper is used. The lower margin is scaled from 0 to 1.0. A line is drawn from the lower left-hand corner to a point on the right representing the dilution increment of 2. The point to be used in determining the 50-percent endpoint (in this case 0.5) is found on the base line. The distance between this point and the diagonal line above is measured with a pair of dividers. The dividers are then moved to the vertical line that is scaled logarithmically and the lower point is placed at the lower dilution (in this case 50); the upper point will fall at the desired endpoint dilution, in this case

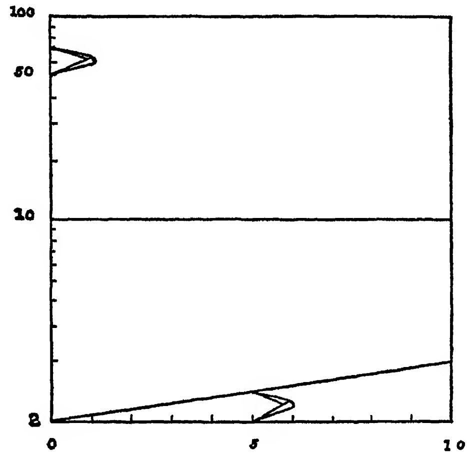

FIGURE 1

71. Hence 1:71 is the dilution of serum A that would, theoretically, allow the survival of 50 percent of the mice.

The 50-percent endpoint dilutions are calculated similarly for the other serums.

In column 9 are shown the values of the 3 unknown sera in relation to the control serum M19 expressed in percentage. In column 10 the values obtained in a second test are given. Column 11 gives the average of the two tests. Thus, in relation to M19, serum A has a protective value of one-half, serum B the same as M19, and serum C about 2½ times as great.

The value of M19 has been previously described as 650 units per cc. for Group I meningococci (*5*). In the last column of table 1 the unit values of sera A, B, and C are given.

Plate precipitation test.—The application of plate precipitation to serum testing was described and illustrated by the authors in a previous paper (*4*). This technique, slightly modified, is as follows:

To three tubes, each containing 16 cc. of melted "hormone" agar, are added, respectively, 0.8, 0.4, and 0.2 cc. of a serum. If the serum is concentrated an additional tube with 0.1 cc. is prepared. The

mixtures are poured into Petri dishes. Similar plates are prepared with each serum under study and with the control serum. Each plate is inoculated with cultures of 4 strains, 2 of Group I and 2 of Group II. The strains used for protection tests are included among these. The inoculum consists of a mass of microorganisms about 2 mm. in diameter, taken from an 18-hour serum glucose agar culture, or from a 5-hour blood agar culture. Readings of the intensity of the reaction are made after 48 hours and again after 72 hours incubation. The examinations are made in a strong light against a dark background. The intensity of the ring of precipitate is expressed as 1+ to 4+. Sometimes the greatest intensity is found at the 48-hour reading and at other times at 72 hours. The maximum intensity is used for the final recording. The results obtained with the sera used as illustrations in this paper are given in table 2.

TABLE 2.—*Plate precipitation reactions with a Group I meningococcus and 4 antimeningococcus sera*

Serum number	Intensity of halo			
	Amount of serum in plate (cc)			
	0 8	0 4	0 2	0 1
A	++	+	−	----
B	+++	++	+	----
C	++++	+++	++	+
M19	++++	++	+	-----

Application of protection test to Group II antibodies.—Strains which have been classified as Group II by the agglutination test have been found to differ immunologically, especially in regard to cross protection. Branham (*6*) has recently drawn attention to the fact that a number of years ago these differences were recognized. But not until the development of the mouse protection technique was this heterogeneity made clear. Hence the choice of a strain, or strains, for testing is more complicated than for Group I. At present the indications are that at least two strains are necessary.

These strains now classified as Group II are less invasive, as a rule, than those of Group I. Consequently, it is usually necessary to use a greater concentration of mucin. For example, under conditions in which 3.5 percent mucin is used for Group I, 4 percent will probably be indicated for Group II. In addition, it is sometimes necessary to use a somewhat larger number of organisms in the test dose.

Reference has already been made to the low mouse protective antibody content for Group II meningococci in the majority of polyvalent antimeningococcus sera. In some sera such antibodies are not demonstrable. In order to detect the presence of Group II anti-

bodies, very low dilutions of sera must be employed. Aside from the factors just mentioned, the mouse protection test for the determination of Group II antibodies is carried out as for those of Group I.

Because of the low content of protective antibody for Group II in antimeningococcus serum it has not been possible to establish a standard for that group. For experimental purposes a value of 25 units per cc. for one particular Group II strain has been assigned to control serum M19 (*5*).

DISCUSSION

There are several factors in this technique which must necessarily be varied from time to time. The susceptibility of the mice is influenced by breed, sex, weight, and season (*1*). On account of this variation it has not been possible to adopt a fixed concentration of mucin for use in all tests. The variability in manufacturers' lots of mucin must also be considered. Under the conditions of experiment at the National Institute of Health in the cooler part of the year 4 percent mucin is usually indicated for our Group I test strain. During hot weather, however, it has been necessary to reduce the concentration to 3.5 percent.

Similarly, the culture dose must be varied. For Group I antibody determinations the test doses employed have varied from 1×10^{-4} to 5×10^{-4}.

SUMMARY

A procedure is described which is recommended for the performance of the mouse protection test for the evaluation of antimeningococcus serum.

REFERENCES

(*1*) Pittman, M.: A study of certain factors which influence the determination of the mouse protective action of meningococcus antiserum. Pub. Health Rep. (In press).
(*2*) Standard Methods of Water Analysis. Am Pub. Health Assoc., New York, 1925, p. 4.
(*3*) Reed, L. J., and Muench, H.: A simple method of estimating 50 percent endpoints. Am. J. Hyg., **27**: 493–497 (1938).
(*4*) Pittman, M., Branham, S. E., and Sockrider, E. M.: A comparison of the precipitation reaction in immune serum agar plates with the protection of mice by antimeningococcus serum. Pub. Health Rep., **53**: 1400–1408 (1938).
(*5*) Branham, S. E., Pittman, M., Rake, G., and Scherp, H. W.: A proposed mouse protection unit for antimeningococcus serum. Proc. Soc. Exp. Biol. and Med., **39**: 348–350 (1938).
(*6*) Branham, S. E.: The meningococcus. Bact. Rev., **4**: 59–96 (1940).

TICKS AND RELAPSING FEVER IN THE UNITED STATES [1]

By Gordon E. Davis, *Bacteriologist, United States Public Health Service*

The history of tick-borne relapsing fever in the United States has been short but rapidly progressive. A report is hardly completed before new records are available. A number of writers have speculated as to the origin of reputed cases reported during the last century, but recent studies indicate that the first ones of proved endemic origin were reported from Bear Creek Canyon, Jefferson County, Colo., by Meader and by Warring in 1915 and 1918, respectively In 1922, Briggs reported two cases from Polaris, Placer County, Calif., and in 1927 Cornick reported the presence of relapsing fever in west Texas. This latter report was further substantiated when eight cases were reported by Oschman's Laboratory of San Angelo (Bohls and Schuhardt), the cases having occured in 1922, 1924, 1926, and 1927. Warring called attention to the endemicity of the disease but a tick vector was not recognized until the observation of Weller and Graham in central Texas in 1930 This marks the beginning of a real interest in the disease.

Since that year case reports indicative of new endemic areas have been published from Arizona (Bannister 1930), Kansas (Closson 1934), Washington, and possibly Montana (Tollefsen 1935), and Nevada (Reynolds 1937). Additional reports, representing areas in which cases are now known to have occurred (only part have been published), have been made from Colorado (1918, 1923, 1930, 1937, 1938, and 1939), Utah (1928, 1930), Nevada (1930, 1932, 1933, 1934, 1935, 1936), Arizona (1930, 1934, 1938, 1939), Idaho (1931, 1938), New Mexico (1934), and Oklahoma (1934), and particularly from some of the more extensive infected areas in Texas and California.

TICK VECTORS

Six species of *Ornithodoros* have been reported from the United States, viz, *O. turicata*, *hermsi*, *parkeri*, *talaje*, *coriaceus*, and *coprophilus*. One or more of these have been reported from 17 States as follows: California, 5 species; Arizona, 3; Colorado, Texas, Florida, and New Mexico, 2 each; and Idaho, Kansas, Minnesota, Montana, Nevada, New York, Oklahoma, Utah, Washington, Wisconsin, and Wyoming, 1 each. The presence of *talaje* in northern States is without doubt due to importation in shipments of materials. However, the three reports by Matheson (1931), Herrick (1935), and Riley (1935) are not without interest. Matheson reported the infestation of a single house, Herrick of 7 houses, and Riley of 2. Riley reported

[1] From the Rocky Mountain Laboratory (Hamilton, Mont), Division of Infectious Diseases, National Institute of Health. Read, in part, before sec VII of the Sixth Pacific Science Congress, Berkeley, Calif , July 1939.

that the infestation had persisted in a rat- and bat-infested house for 6 years, and Matheson's report indicated that the infestation had persisted for at least 3 years and possibly as long as 16. A letter dated June 23, 1939, from the owner of this house, stated that ticks were still present. A female *talaje* was submitted in confirmation of this report. This definitely established the existence of the infestation for at least 11 years.

Table 1 lists the States from which *Ornithodoros* ticks have been reported and shows for each present knowledge regarding the occurrence of relapsing fever, the species of tick vector, if known, and other species of *Ornithodoros* reported.

TABLE 1.—*Relapsing fever in the United States. Endemicity, known vectors, and reported species of Ornithodoros by States*

State	Relapsing fever	Tick vector	*Ornithodoros* sp. reported	Remarks
Arizona	Present	Unknown	*turicata, talaje, coprophilus.*	Spirochetes recovered from *talaje* not collected from known foci.
California	do	*hermsi*	*hermsi, turicata, talaje, coriaceus, parkeri.*	
Colorado	do	do	*hermsi, parkeri*	
Florida	None		*turicata, talaje*	
Idaho	Present	*hermsi*	*hermsi*	*hermsi* collected in cabin where cases originated.
Kansas	do	*turicata*	*turicata*	
Minnesota	None		*talaje*	
Montana	?	Unknown	*parkeri*	Spirochetes recovered from *parkeri* from southwestern Montana.
Nevada	Present	Probably *hermsi* near Lake Tahoe, also *parkeri*	do	*parkeri* collected in an endemic area
New Mexico	do	Unknown	*turicata, talaje*	
New York	None		*talaje*	
Oklahoma	Present	*turicata*	*turicata*	
Texas	do	do	*talaje, turicata*	
Utah	do	Unknown	*parkeri*	
Washington	do	do	do	
Wisconsin	None		*talaje*	
Wyoming	do		*parkeri*	Spirochetes recovered from *parkeri* from southwestern Wyoming.

In table 2 records of early data are taken from recognized source material while more recent records are attributed to the individual collectors.

O. turicata.—A known vector in Texas and Kansas. Also reported from Arizona, California, Oklahoma, New Mexico, and Florida. This species was first recognized as a vector in Texas by Weller and Graham in 1930 and in Kansas by Davis in 1936. In Texas it has been found mainly in caves, while in Kansas it was recovered from rodent burrows, ground squirrels (*Citellus* sp.), prairie dogs (*Cynomys* sp.), cottontail rabbits (*Sylvilagus* sp.), jack rabbits (*lepus* sp.), burrowing owls (*Speotyto cunicularia hypogaea*), and terrapin (*Terrapene ornata*). Bohls and Schuhardt have demonstrated spirochetes in naturally infected armadillos (*Dasypus* sp.) and opossum (*Didelphis* sp.).

TABLE 2.—*Distribution of species of Ornithodoros in the United States*[1]

O. turicata (Dugès): Florida (Hubbard 1894, Banks 1908), Texas (Banks 1908), Arizona (Banks 1908), California (Banks 1908), New Mexico (Banks 1908), Kansas (Davis 1936), Oklahoma (Davis 1936).

O. hermsi Wheeler: California (Herms and Wheeler 1931), Idaho (von Ende 1931), Colorado (Davis 1938).

O. parkeri Cooley: Wyoming (Davis 1934), Washington (Philip 1934, Jellison 1938), Montana (Jellison 1936), Utah (members of the Public Health Service Plague Laboratory, San Francisco, 1936), Colorado (same as for Utah, 1938), Nevada (Davis 1939), California (Davis, 1939).[2]

O. talaje (Guerin Menneville): Florida (Banks 1908), Texas (Banks 1908, Kohls 1938), California, San Clemente Island (Banks 1908), California, Mainland (Aitken 1938, Howell 1938), Minnesota (Howard 1915, Riley 1935), New York (Matheson 1931), Wisconsin (Herrick 1935).

O. coprophilus McIntosh: Arizona (Wehrle 1931, Philip 1939).

O. coriaceus Koch: California (Nuttall 1904).

[1] A tentative list subject to correction. Records of *talaje* in Nevada and in Colorado have been omitted until more definite information can be obtained.

[2] In 1935 Dr. Barbara C. McIvor, of the University of California at Berkeley, received a female tick taken from a man at Los Banos, Merced County, Calif., and after studying the specimen and its progeny, described the species as *Ornithodoros wheeleri* n. sp. Following the present writer's collection of approximately 125 specimens in 1939 from Fresno and Kern Counties, Dr. R. A. Cooley, of the Rocky Mountain Laboratory, studied specimens of *O. wheeleri* and the specimens mentioned above, in connection with an extended review of numerous lots of *Ornithodoros*, and concluded, in view of the present better understanding of this genus, that it was necessary to make *wheeleri* a synonym of *parkeri*.

O. hermsi.—A known vector in California, Colorado, northern Idaho, and probably a vector in west central Nevada. This species was collected in California by Herms and Wheeler in 1931, in northern Idaho by C. L. von Ende, of the University of Idaho, that same year, and in Colorado by Davis in 1938. In a publication on relapsing fever in 1935 Briggs reported that Dr. Mark Boyd, now of the Rockefeller Foundation, had pointed out that *talaje* had been identified "as far back as 1914 within a few miles of Polaris," Calif. The one remaining specimen which had been received by Dr. Boyd when he was at the University of Nevada has been kindly submitted for reexamination. This specimen has been identified by Dr. R. A. Cooley as *hermsi*, thus establishing the presence of this tick in the vicinity of Lake Tahoe approximately 20 years prior to its recognition as a new species. Spirochetes have been recovered from naturally infected ticks in both California and Colorado. In California these ticks have been found mainly in chipmunks' (*Eutamias* sp.) nests in mountain cabins while in Colorado they were recovered from crevices in decaying stumps containing chipmunk nesting material. Porter, Beck, and Stevens have demonstrated spirochetes in the blood of naturally infected chipmunks and chickaree squirrels (*Sciurus* sp.), and report a human case contracted by handling the latter.

O. parkeri.—Collected in Wyoming, Washington, Montana, Utah, Colorado, Nevada, and California. It has been taken from ground squirrels (*Citellus* spp.), jack rabbits, cottontail rabbits, prairie dogs, a weasel (*Mustela* sp.), a whitefooted mouse (*Peromyscus* sp.), and from nests of the burrowing owl. In central Washington this tick was recently consistently found by Assistant Parasitologist W. L. Jellison, sometimes in large numbers, in burrows occupied by

burrowing owls. This species has not been positively connected with human cases. However, it feeds readily on man and is the only known species in areas from which at least 17[2] cases have originated. In western Nevada it was collected (Davis 1939) from a ground squirrel burrow located near a cabin where a case of relapsing fever had occurred. Spirochetes have been recovered from ticks collected in Wyoming, Montana, and Utah.

O. talaje.—Reported from Arizona, California, New Mexico, Texas, Florida, New York, Minnesota, and Wisconsin. It has the most extensive geographic distribution known for any of our species. Although it is a recognized vector in Panama, it has not been reported as such in the United States. In Arizona, Kohls and Cooley found it infesting kangaroo rats (*Dipodomys* sp.) and their burrows. This is believed to be the first native host record in the United States. Spirochetes were recovered by the writer from this material.

O. coriaceus (*only from California*) and *O. coprophilus* (*only from Arizona*).—No cases have been attributed to the bite of these ticks and naturally infected ticks have not been definitely demonstrated. However, based on world-wide records, any species of *Ornithodoros* may be considered a potential vector.

SUMMARY

Six species of *Ornithodoros* have been recognized in the United States. One or more species have been reported from each of 17 States. Tick-borne relapsing fever is present in 11 States. The known vectors are *turicata* in Texas and Kansas, and *hermsi* in California, Colorado, and northern Idaho. *O. parkeri* is the only known species in a large area from which 17 cases have been reported. Spirochetes have been recovered from *talaje* collected in Arizona and from *parkeri* collected in Wyoming, Montana, and Utah.

REFERENCES

Bannister, Kimball (1930): Relapsing fever (febris recurrens, Ruckfallfieber, spirillum fever, tick fever). Southwestern Med., 14: 581-2.

Bohls, S. W., and Schuhardt, V. T. (1933): Relapsing fever in Texas and the laboratory method of diagnosis. Texas State J. Med., 29: 199-203.

Briggs, LeRoy H. (1922): Relapsing fever in California. J. Am. Med. Assoc., 79: 941-44.

——— (1935): Relapsing fever. Calif. and West. Med., 42: 350-351.

Closson, Harold O. (1934): Relapsing fever. J. Kansas Med. Soc., 35: 53-4.

Cornick, Boyd (1927): Relapsing fever. Presented before Bexar County Medical Society, Texas.

Davis, Gordon E. (1936): *Ornithodoros turicata:* The possible vector of relapsing fever in southwestern Kansas. Pub. Health Rep., 51: 1719.

Davis, Gordon E. (1939): *Ornithodoros parkeri:* Distribution and host data; spontaneous infection with relapsing fever spirochetes. Pub. Health Rep., 54: 1345-49.

Davis, Gordon E. (1939): Relapsing fever: *Ornithodoros hermsi* a vector in Colorado. Pub. Health Rep., 54: 2178-80.

Fulstone, Mary: Personal communication.

Herms, W. B., and Wheeler, C. M. (1935): Tick transmission of California relapsing fever. J. Econ. Ent., 28: 846-55.

Herrick, C. A. (1935): The tick *Ornithodoros talaje* in Wisconsin houses. J. Parasitol., 21: 216-17.

[2] Two cases, one from Washington and one probably from Montana, treated by Dr. Tollefsen at the Veterans' Administration Facility Hospital, Walla Walla, Wash.; 2 from Utah, one treated by Dr. H. G. McNeil, then of Salt Lake City, and 1 reported by Porter, Beck and Stevens; 9 cases treated by Dr. George R. Magee of Yerrington, Nev., and 4 cases treated by Dr. Mary Fulstone of Smith, Nevada.

Kohls, Glen M., and Cooley, R. A. (1936): Notes on the occurrence and host relationships of the tick *Ornithodoros talaje* in Arizona. Pub. Health Rep., 51: 512–13.
Magee, George R. (1930): Relapsing fever case reports. Presented before the Nevada Medical Society.
Matheson, Robert (1931): Note of the tick *Ornithodoros talaje* (Guer-Men). Parasit., 23: 270.
Meader, C. N. (1915): Five cases of relapsing fever originating in Colorado. Colorado Med., 12: 365–68.
Porter, G. S., Beck, M. D., and Stevens, L. M. (1932): Relapsing fever in California. Am. J. Pub. Health, 22: 1136–40.
Reynolds, Frank C. (1937): Relapsing fever: Comments on its incidence in Nevada. Calif. and West. Med., 47: 170–174.
Riley, Wm. A. (1935): Minnesota records of *Ornithodoros talaje*. J. Parasitol., 21: 217. Also personal correspondence.
Tollefsen, A. D. (1935): Relapsing fever. Med. Bul. Vet. Admin., 12: 84–5.
Warring, James J. (1918): Relapsing fever endemic in Colorado. Colorado Med., 15: 148–50.
———— (1918): Am. J. Med. Sci., N S., 145: 819–25.
Weller, Burford, and Graham, G. M. (1930): Relapsing fever in central Texas. J. Am. Med. Assoc., 95: 1834–35.

NURSING VISIT TRANSCRIPTS AS TRAINING MATERIAL

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In all professional training, modern educational institutions bring theory and practice together whenever possible. If the student is training for any profession that involves human relationships, his knowledge of actual situations, their complexity and emotional content, is of utmost importance. Thus, schools of social work use case studies and verbatim interview reports; medical schools bring patients to the classroom and clinic; teachers colleges employ lesson plans and stenographic reports of classroom work as teaching devices. All these methods have as one of their primary purposes the imparting to the student of a knowledge of the intricate human relationships with which he will have to deal in his professional career. In each instance such illustrative material supplements the practice work in social agency, hospital, or model school classroom, as the case may be.

In the professional training of public health nurses, similar procedures are followed. Case studies, field record forms, and sometimes copies of actual field records of cases are made available to the student. But up to the present, no verbatim reports of actual home visits have been available for instructors of public health nursing to use with their students. The teaching value of such material has been felt so strongly that many instructors have written imaginary visits based upon their past experience. Although such fabricated visits have been used with considerable success, they often sound artificial and students are likely to question whether the situations described

[1] From the Division of Public Health Methods, National Institute of Health.

actually arise. Naturally, such resistance interferes with the learning process.

It is with a distinct sense of satisfaction therefore that the Division of Public Health Methods, National Institute of Health, is able to announce that transcripts of 23 public health nursing visits are now available to nursing instructors upon request.[2] The transcripts reproduced were selected from reports of 1,200 visits collected during a study of educational activities of public health nurses.[3]

The presentation of complete conversations, of both the nurse and the family, clearly demonstrates not only the nurse's teaching technique in a specific situation but also the response of the family to this teaching. Each visit is placed in its proper setting by supplementing the transcript with a copy of the record of all nursing and clinic visits prior to the time of the transcribed visit, and of the services for a 2-month period after the visit.

USES OF TRANSCRIPTS IN PUBLIC HEALTH NURSING COURSES OF STUDY

Perhaps the most important use of transcripts in teaching public health nursing lies in the fact that in this way a whole class may, so to speak, witness a given home visit and discuss it as it proceeds—a procedure obviously impossible in the actual home situation. Not only detailed analysis but also general discussion, if desired, is thus possible, with the added distinct advantage that no one need rely on memory alone to keep in mind precise points of procedure to be evaluated or commented on. In other words, the content may be kept before a group indefinitely; or, conversely, routine material may be quickly passed over without waste of time. Since neither simultaneous discussion nor the "slow-motion" effect is practical with a real home visit, these possibilities give the transcript a unique value as a method for introducing nurses to the theory and practice of home visiting.[4]

With no attempt to list all possible ways in which these materials may be used, it may be well to examine a few teaching situations in which the transcripts have been found effective. The list of such situations and methods of use could, no doubt, be amplified indefinitely.

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[2] The supply of copies is limited, distribution is therefore restricted to instructors in public health nursing schools, and to educational directors of health departments and other health organizations

[3] Papers describing the study and presenting some of its findings are

The Nurse as a Family Teacher Public Health Nursing, 30: 357-365 (June 1938)

How May the Nurse Become a Better Teacher Health Officer, 3: 253-268 (January 1939)

Administrative Procedures that Interfere with Effective Public Health Nursing Health Officer, 4: 18-23 (May 1939)

The Nurse as a Teacher of Tuberculosis to the Family Transactions of the 35th Annual Meeting of the National Tuberculosis Association, 1939

Evaluation of Health Education Content and Materials, read at the Health Education Institute, Pittsburgh, Pa., October 16, 1939, mimeographed and available from American Public Health Association.

[4] Transcripts are not to be considered as a substitute for the observation of actual home visits, but the latter are likely to be much more meaningful if the student has analyzed transcripts previously.

It is hoped that, through the ingenuity of other instructors in the field, many other methods may be developed.

With beginning students who are not sufficiently familiar with public health nursing procedures to be able to analyze a visit as a whole, it has proved most useful to choose excerpts illustrating points under discussion. For example, in discussing the desirability of appealing to the family's interest in the welfare of its members, such excerpts as the following might be used to contrast teaching techniques.

Patient's interest in her own welfare considered

NURSE. The baby has to have calcium to make bones, and if you don't give it in the form of milk, he'll take it from your teeth.

Mrs. C. Oh, I don't want to lose any of my teeth.

NURSE. Well, that's why you should drink milk.

Patient's interest ignored

NURSE. How about those calcium tablets?

Mrs. B. No ma'am, I haven't got them yet.

NURSE. But now is the time to take them. The *doctor* will be provoked that you haven't.

Or, as an illustration of the fact that a statement or direction may be substantially correct but, because it is not sufficiently explicit, a lay person may not know exactly what to do, the following contrasts might serve:

Insufficient advice

NURSE. Don't nurse the baby every time she cries. She isn't always hungry.

Specific instruction

NURSE. You should nurse her every 4 hours by the clock. You have a clock here so you can see it, and you should wake her up when it's time to nurse. What time did you nurse the baby this morning? The last time?

MRS. Ten o'clock.

NURSE. At 10. Then nurse her again at 2, then at 6 and 10 at night, and once in the middle of the night, and start at 6 in the morning.

Aside from such elementary techniques as those illustrated here, the transcripts contain examples of almost all the common teaching and psychological principles. Comparison and contrast help to give concrete meaning to a principle and facilitate understanding of its application.

Students with public health nursing experience may profitably study entire visits. Such students are first asked to note the purpose of the visit and observe the extent to which it was achieved. They then analyze both good and bad points in the visit according to the principles of family health teaching. This exercise may be made

especially constructive if students will indicate how the family's questions, comments, and responses might have been handled in each situation in which the nurse's teaching is adversely criticized. Positive emphasis is given to the good teaching or mental hygiene techniques illustrated in the visit.

When any such assignment is made, it is highly important to make certain that students understand fully the limitations of verbatim records which can present only the bare words of a call but little or no evidence as to attitudes—the nods, smiles, frowns, and gestures that are as expressive as words and sometimes take the place of them. Furthermore, a transcript cannot record the pace of the visit. What may appear as a long uninterrupted series of instructions may, in the actual visit, have been broken by the nurse's moving about the room giving care or pausing for the patient's nod or other gesture. Students may need to be cautioned against an overcritical attitude toward colloquial speech, grammatical errors, or poor sentence structure in transcripts. The transcripts are not edited or polished to appear as written documents; they are conversational and therefore informal.

Transcripts are valuable in teaching students how to keep records. After reading a transcript students make narrative notes of the visit and plans for the next visit. This procedure is particularly advantageous for beginners, inasmuch as they can give full attention to selecting facts that are important to record without being confused by the field situation in which they must but remember and hurriedly record the content amidst the confusion that is so often found in a home. After the students have completed their records, plans for the next visit are discussed in relation to the records they have made and also in relation to the transcript. Thus, when the student goes to a field agency, she is better prepared by having had some practice in recording.

For advanced students, transcripts and records provide material for special studies. For example, one may study the adequacy and completeness with which field nurses record their visits by comparing the content of the transcript with the nurse's notations.

Through study of the transcripts, students in supervision may escape the common educational pitfall of learning abstract theory and principles but not their application to practical situations. Such a student should read each transcript and indicate what steps she would take to supervise the nurse who made the visit. This may involve simply outlining the supervisory conference with the nurse, or it may go so far as to include plans for the nurse's further education if the student feels that the nurse needs more complete and accurate knowledge. A whole class can discuss the supervisory techniques which would be called into use in supervising a nurse who made such a visit; group discussion often throws much light on the student supervisor's

problems. The relationship between supervisor and staff nurse is the key to all the supervisor's functions; transcripts afford excellent additional opportunities to discuss all phases of this key relationship, starting with the characteristics of the nurse as shown in the visit. Since the transcribed visits were made by a variety of staff nurses, many different personal assets and liabilities may be studied in the light of supervisory procedures that might be used in dealing with them.

Transcripts of actual visits have already proved an invaluable aid in teaching public health nursing to students, not only because they closely approach actual observation of field visits but also because, as is not possible in real visits, a whole class may discuss identical situations with the instructor. It is felt that this advantage of transcripts should open a wide field for further experimentation in their use.

WHAT YOU SHOULD KNOW ABOUT INFLUENZA *

Influenza, one of the most widespread and destructive diseases of man, still remains unconquered, although a number of the great epidemic diseases have fallen before the determined technicians of medical science. Numerous factors are responsible for this lack of progress in the prevention and control of influenza. For example, the exact cause has not been determined for all types of influenza. The short period of development without recognizable symptoms permits the affected individual to continue his normal routine, thereby spreading the disease to many others before he is sick enough to go to bed. Isolation of such large groups is not practical. Finally, since immunity following infection is of short duration, one year or less, a significant proportion of the population is continuously susceptible to the disease.

What Causes Influenza?

The cause of influenza is at present believed to be filterable viruses of different strains, one of which has been isolated. Viruses are active agents too small to be seen with any microscope. Various other types of bacteria may cause complications in the disease.

How Is the Disease Spread?

The virus is present in the discharges from the mouth and nose. Coughing and sneezing spray the infecting agent into the air. These small droplets of moisture may be inhaled by persons nearby. Articles freshly soiled with discharges from the nose and throat of sick persons may transfer the virus. There is no evidence that the virus

* This material is available in leaflet form, and a limited number of copies may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

is ever carried in drinking water or milk. MAN is the carrier of influenza.

Symptoms of Influenza.

Symptoms of influenza are observed within 24 to 72 hours following invasion of the body with the virus. Typically, it is a more severe infection than the common cold. Fever and general muscular pains in the back, head, and limbs develop and usually last about a week. "Flu" leaves the patient exhausted out of all proportion to the length of time he is ill.

The most serious and important complication following influenza is pneumonia, which may be severe and sometimes fatal. Other serious complications are infections of the ear, or sinuses, and bronchitis.

Laboratory procedures have no practical value in determining the diagnosis of influenza with certainty. In its initial stages, influenza is frequently indistinguishable from the common cold.

Precautions to Observe.

It is believed that there is more danger of spreading the disease from persons in the early stages of "flu" than from those ill enough to be in bed or those who are recovering. In any case, unnecessary contacts should be avoided. Since few, if any, can hope to escape contact, it is not rational to become panicky or to attempt to avoid infection in too elaborate ways. Experience in previous epidemics has taught some valuable lessons. The closing of public, parochial, and private schools has not been effective in checking the spread of influenza. Relatively simple hygienic practices and rules of life are the most helpful. The persons who try to keep on their feet and "stick it out" are those who contribute the greatest numbers to the death rolls. In their weakened condition, secondary invading germs gain a foothold and permit the development of serious complications.

In protecting himself from influenza, an individual can generally do as much as anyone else can do for him, if not more.

What You Should Do Before Infection.

1. During an epidemic, avoid needless contact with others, especially people who are coughing, sneezing, or sniffling.
2. Avoid exposure to inclement weather, but take advantage of as much open air and sunshine as you can.
3. Be sure that your home is well ventilated at all times, but avoid drafts.
4. Eat a well-balanced diet; drink plenty of water.
5. Guard against fatigue; get plenty of rest and sleep.
6. Wear clothing suitable to the weather.

What To Do After Exposure.

1. At the first sign of a cold and especially if you have fever *go to bed and stay there until your doctor says it is safe to get up.* By so doing, you may prevent serious complications and check the spread of the disease to others.

2. Cover all coughs or sneezes with a handkerchief, preferably paper tissues which should be promptly burned.

3. Do not encourage visitors.

The New Flu Vaccine.

A vaccine has been developed from one of the strains of influenza virus. However, the use of this vaccine is still in the experimental stage. It is too soon to make any statements concerning the efficacy of this discovery.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT. CONSULT YOUR DOCTOR

COURT DECISION ON PUBLIC HEALTH

Annulment of marriage because of concealment of syphilis.—(St. Louis, Mo., Court of Appeals; *Watson* v. *Watson,* 143 S.W.2d 349; decided October 8, 1940.) A husband brought an action for the annulment of his marriage on the ground that the wife had fraudulently misrepresented and concealed from him the fact that she was afflicted with syphilis prior to the marriage. It appeared that the plaintiff, upon proposing marriage to the defendant, had inquired of her as to the condition of her health and as to whether or not she had any venereal disease, and that she had assured him that she had nothing the matter with her. About a year after the marriage a test showed that the defendant was suffering from syphilis, and the records of the hospital to which the defendant was admitted some 9 months later showed that, when admitted, she was suffering from the disease in the last stage. Immediately upon discovering that the defendant was infected, the plaintiff ceased cohabitation. He testified positively that he had no knowledge of the defendant's condition prior to the marriage.

The appellate court reversed the judgment of the lower court for the defendant and remanded the cause with directions to enter judgment annulling the marriage. "The evidence," said the court, "of fraudulent misrepresentation or concealment by defendant of the fact that she was suffering from syphilis is shown by clear, satisfactory, and convincing evidence. Such a fraud pertains to an essential of the marriage relation and obviously entitles plaintiff to an annulment of the marriage."

DEATHS DURING WEEK ENDED DECEMBER 7, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 7, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,565	8,554
Average for 3 prior years	8,654	
Total deaths, first 49 weeks of year	409,968	403,581
Deaths under 1 year of age	514	488
Average for 3 prior years	519	
Deaths under 1 year of age, first 49 weeks of year	24,661	24,324
Data from industrial insurance companies:		
Policies in force	64,817,132	66,500,419
Number of death claims	12,569	12,202
Death claims per 1,000 policies in force, annual rate	10.1	9.6
Death claims per 1,000 policies, first 49 weeks of year, annual rate	9.6	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 14, 1940

Summary

A total of 29,864 cases of influenza was reported for the current week as compared with 9,663 for the preceding week, an increase of more than 20,000 cases, accounted for principally by the increase in California (from 6,772 to 13,133), Utah (from 243 to 8,288), Arizona (from 471 to 1,662), Idaho (from 17 to 1,113) Washington (from 95 to 914), and Oregon (from 368 to 978). Of the total number of cases reported during the current week, approximately 90 percent occurred in the Mountain and Pacific States while the four eastern and north central groups (New England, Middle Atlantic, East North Central, and West North Central) reported less than 2½ percent. The current figures bring the cumulative total for the first 50 weeks of the current year to 221,737, higher than the figure for the corresponding period of any of the 5 preceding years with the exception of 1937, when 288,665 cases were reported.

Telegraphic information from State health officers, dated December 17, stated that the disease was spreading in Utah, with an estimated 40 percent of school enrollment affected, and a slight increase in pneumonia incidence; that 500 new cases had been reported in Nevada; that there was State-wide prevalence of a mild infection in Oklahoma, with 25 to 50 percent of persons affected in State schools and institutions and some schools closed; and that about 600 mild cases a week were occurring in Texas. A moderately intense outbreak of upper respiratory infection was reported in southwest Louisiana, with an estimated 5,000 cases in Alexandria and 1,000 cases in Lafayette, with no deaths. Information so far available indicates that the infection is mild, although explosive in character, with few deaths reported.

For the current week, the incidence of the other 8 communicable diseases included in the following table remained close to the 5-year (1935–39) median expectancy, measles, poliomyelitis and whooping cough being slightly above the median. Of the 9 diseases, the cumulative totals of only influenza and poliomyelitis are above last year's figures and the 5-year medians.

Three cases of tularemia were reported in Maryland, 2 in the District of Columbia, and 1 fatal case was reported in Connecticut. Of 41 cases of endemic typhus fever, 13 cases were reported in Georiga, 8 in Texas, and 7 in Alabama.

For the current week the Bureau of the Census reports 8,648 deaths in 88 major cities of the United States, as compared with 8,565 for the preceding week and with a 3-year (1937–39) average of 8,641 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended December 14, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Dec. 14, 1940	Dec. 16, 1939		Dec. 14, 1940	Dec. 16, 1939		Dec. 14, 1940	Dec. 16, 1939		Dec. 14, 1940	Dec. 16, 1939	
NEW ENG.												
Maine	0	2	2	7	------	------	93	52	42	0	1	1
New Hampshire	1	0	0	------	------	------	0	1	1	0	0	0
Vermont	0	0	0	------	------	------	21	21	21	0	0	0
Massachusetts	3	5	5	------	------	------	302	329	212	2	1	1
Rhode Island	0	1	1	------	------	------	2	87	12	0	0	0
Connecticut	1	1	5	6	1	2	9	60	68	0	0	0
MID. ATL.												
New York	15	22	37	[1] 20	[1] 29	[1] 14	985	425	425	3	2	5
New Jersey	11	9	19	3	15	13	301	21	30	0	1	1
Pennsylvania	14	27	35	------	------	------	1,170	51	67	1	12	5
E. NO. CEN.												
Ohio	8	13	24	23	54	25	139	27	27	3	2	4
Indiana	11	18	27	213	20	34	14	9	11	1	0	2
Illinois	16	44	14	18	14	17	737	18	29	1	0	2
Michigan [2]	15	10	16	9	6	3	807	391	155	3	0	1
Wisconsin	1	0	1	42	44	44	417	68	68	0	0	0
W. NO. CEN.												
Minnesota	0	1	1	1	1	1	11	130	47	0	0	0
Iowa	3	4	12	1	7	4	59	43	12	0	0	0
Missouri	13	13	15	27	2	55	23	7	5	1	0	2
North Dakota	5	0	2	28	85	12	2	1	2	0	0	1
South Dakota	0	5	3	------	------	------	5	7	5	0	0	0
Nebraska	0	2	3	3	------	------	6	8	8	0	0	0
Kansas	4	6	8	16	27	4	59	73	6	0	1	1
SO. ATL.												
Delaware	0	2	0	------	------	------	14	0	4	0	1	0
Maryland [3]	4	12	15	10	14	10	4	5	43	0	0	0
Dist. of Col.	0	1	10	2	--	------	0	5	3	0	0	0
Virginia [3]	23	46	44	228	148	------	126	30	30	2	1	2
West Virginia [3]	2	18	18	27	2	49	3	9	16	1	2	3
North Carolina [3]	35	09	63	11	50	9	19	325	270	1	0	0
South Carolina [3]	11	22	9	359	2,353	410	10	7	11	0	5	2
Georgia [3]	7	14	20	214	327	77	1	22	------	0	0	0
Florida [3]	12	7	7	13	11	5	1	2	6	0	0	0
E. SO. CEN.												
Kentucky	10	17	18	31	6	24	147	7	10	3	2	3
Tennessee [3]	8	12	23	52	46	72	22	56	36	2	0	8
Alabama [3]	22	27	26	112	508	189	35	8	10	1	1	1
Mississippi [2] [3]	13	15	15	------	------	------	------	------	------	0	1	1
W. SO. CEN.												
Arkansas	7	16	15	234	93	93	23	1	3	1	9	1
Louisiana [3]	11	14	19	321	9	10	0	1	3	1	0	1
Oklahoma	27	9	16	537	91	91	0	10	5	3	1	2
Texas [3]	46	50	59	671	341	385	20	47	36	1	1	1
MOUNTAIN												
Montana	3	1	1	60	548	17	4	8	8	0	0	0
Idaho	0	0	0	1,113	22	3	3	59	59	0	0	0
Wyoming	0	0	0	4	514	------	2	8	4	0	0	0
Colorado	5	7	8	42	103	------	154	6	7	0	2	1
New Mexico	0	5	6	1	------	------	51	1	21	0	0	0
Arizona	0	11	7	1,662	88	73	47	4	4	0	0	0
Utah [2]	3	2	0	8,288	610	------	2	106	18	0	0	0
Nevada	0	------	------	430	------	------	0	------	------	0	------	------
PACIFIC												
Washington	7	0	1	914	------	1	15	893	160	2	0	1
Oregon	1	0	1	978	176	31	26	53	17	1	1	1
California	12	33	43	13,133	34	34	44	120	120	0	3	3
Total	393	593	735	28,864	6,465	1,971	5,935	3,622	3,622	34	50	80
50 weeks	15,132	23,064	27,490	221,737	170,238	153,510	263,575	370,015	370,015	1,549	1,901	5,226

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 14, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Dec. 14, 1940	Dec. 16, 1939		Dec. 14, 1940	Dec. 16, 1939		Dec. 14, 1940	Dec. 16, 1939		Dec. 14, 1940	Dec. 16, 1939	
NEW ENG.												
Maine	0	0	1	12	24	29	0	0	0	0	4	1
New Hampshire	0	0	0	2	3	7	0	0	0	0	0	1
Vermont	0	0	0	18	0	4	0	0	0	1	1	1
Massachusetts	0	1	0	169	88	158	0	0	0	5	1	2
Rhode Island	0	0	0	6	11	11	0	0	0	0	0	0
Connecticut	0	0	0	45	63	63	0	0	0	0	1	1
MID. ATL.												
New York	1	9	0	300	379	410	0	0	0	5	6	9
New Jersey	0	1	1	122	177	91	0	0	0	3	4	2
Pennsylvania	1	2	2	247	346	364	0	0	0	6	6	12
E. NO. CEN.												
Ohio	12	1	1	152	228	320	1	1	1	0	3	3
Indiana	1	0	0	108	138	163	1	4	4	3	2	3
Illinois	8	1	1	355	340	381	1	2	6	1	4	4
Michigan [2]	2	2	2	185	296	363	6	1	1	4	0	7
Wisconsin	13	1	0	149	160	174	6	3	5	1	0	0
W. NO. CEN.												
Minnesota	2	8	1	76	129	140	29	6	8	1	0	0
Iowa	3	12	1	75	92	104	1	6	11	1	0	1
Missouri	3	1	1	94	48	140	1	1	1	6	8	3
North Dakota	0	1	0	25	46	46	2	1	5	0	0	0
South Dakota	0	1	0	14	37	37	0	13	13	0	0	0
Nebraska	1	0	0	36	30	31	0	1	1	1	1	0
Kansas	2	0	0	65	103	160	1	0	2	1	0	0
SO. ATL.												
Delaware	0	1	0	11	16	12	0	0	0	0	0	0
Maryland [3]	0	0	0	57	54	62	0	0	0	3	2	5
Dist. of Col.	0	0	0	9	12	12	0	0	0	0	1	1
Virginia [3]	3	0	0	67	45	55	0	0	0	5	5	5
West Virginia [3]	3	1	0	52	71	71	0	0	0	5	2	2
North Carolina [3]	3	0	0	78	90	65	0	1	0	9	2	4
South Carolina [3]	2	0	0	13	34	12	0	0	0	1	1	1
Georgia [3]	1	0	1	42	35	35	0	0	0	4	6	6
Florida [3]	3	0	0	4	6	6	1	0	0	6	2	3
E. SO. CEN.												
Kentucky	2	1	1	84	76	72	0	0	0	6	0	3
Tennessee [3]	0	0	0	100	87	60	0	0	1	4	0	1
Alabama [3]	0	1	1	21	60	20	0	0	0	1	2	2
Mississippi [2] [3]	2	0	1	11	23	17	0	0	0	0	3	3
W. SO. CEN.												
Arkansas	0	0	1	16	20	20	2	1	1	1	6	5
Louisiana [3]	[4] 1	0	0	5	25	23	0	0	0	7	7	12
Oklahoma	1	1	1	27	17	25	4	5	1	8	7	7
Texas [3]	1	1	1	63	32	114	2	1	1	6	13	14
MOUNTAIN												
Montana	0	0	0	16	39	39	1	2	15	1	1	1
Idaho	0	6	0	15	13	13	1	0	2	1	1	0
Wyoming	1	0	0	8	9	9	0	0	2	1	0	0
Colorado	1	4	1	31	28	43	0	15	5	3	0	1
New Mexico	1	1	1	10	31	28	0	0	0	2	6	5
Arizona	0	3	1	5	5	9	0	0	0	2	0	0
Utah [2]	1	9	0	7	26	35	0	0	0	1	2	0
Nevada	0	----	----	1	----	----	0	----	----	0	----	----
PACIFIC												
Washington	6	0	0	28	41	57	0	0	9	0	1	1
Oregon	1	1	1	19	22	47	0	0	7	0	1	2
California	3	7	7	75	168	223	2	2	3	3	13	13
Total	85	78	66	3,130	3,829	4,658	62	66	174	119	125	163
50 weeks	9,685	7,203	7,203	149,649	155,043	214,811	2,354	9,346	9,346	9,405	12,541	14,351

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 14, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued.

Division and State	Whooping cough, Week ended Dec. 14, 1940	Whooping cough, Week ended Dec. 16, 1939
NEW ENG.		
Maine	27	86
New Hampshire	12	4
Vermont	7	41
Massachusetts	287	175
Rhode Island	2	34
Connecticut	127	90
MID. ATL.		
New York	403	430
New Jersey	174	137
Pennsylvania	597	295
E. NO. CEN.		
Ohio	305	132
Indiana	13	25
Illinois	176	91
Michigan [2]	353	161
Wisconsin	118	186
W. NO. CEN.		
Minnesota	110	67
Iowa	10	17
Missouri	146	26
North Dakota	11	9
South Dakota	6	0
Nebraska	28	3
Kansas	124	11
SO. ATL.		
Delaware	17	6
Maryland [2]	80	71
Dist. of Col.	10	19
Virginia [3]	82	15
West Virginia [2]	45	12
North Carolina [3]	208	61
South Carolina [3]	38	16
SO. ATL.—continued		
Georgia [3]	9	9
Florida [3]	12	4
E. SO. CEN.		
Kentucky	104	70
Tennessee [3]	79	19
Alabama [4]	50	21
Mississippi [2] [3]		
W. SO. CEN.		
Arkansas	21	11
Louisiana [3]	4	0
Oklahoma	61	0
Texas [3]	202	54
MOUNTAIN		
Montana	14	6
Idaho	4	0
Wyoming	0	8
Colorado	40	12
New Mexico	23	28
Arizona	11	1
Utah [2]	19	65
Nevada	1	
PACIFIC		
Washington	78	21
Oregon	16	33
California	288	137
Total	4,612	2,719
50 weeks	164,231	168,386

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended December 14, 1940, 41 cases, as follows: Virginia, 1; North Carolina, 2; South Carolina, 3; Georgia, 13; Florida, 2; Tennessee, 1; Alabama, 7; Mississippi, 2; Louisiana, 2; Texas, 8.
[4] Delayed report.

PSITTACOSIS IN CONNECTICUT

Under date of December 9, 1940, Dr. Stanley H. Osborn, Commissioner of Health of Connecticut, reported one case of psittacosis in a patient who became ill November 2. Her physician suspected psittacosis because a recently purchased parakeet, received in Springfield, Mass., from a pet shop in California in October of this year, had been ill a few days prior to the onset of illness of the patient.

WEEKLY REPORTS FROM CITIES

City reports for week ended November 30, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	196	152	43	763	500	1,116	11	335	30	1,078	--------
Current week [1]	75	530	26	1,742	377	787	5	287	21	1,569	--------
Maine:											
Portland	0	------	0	0	2	0	0	0	0	21	17
New Hampshire:											
Concord	0	------	0	0	0	1	0	0	0	0	14
Manchester	0	------	0	0	4	5	0	0	0	0	24
Nashua	0	------	0	0	0	0	0	0	0	0	4
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	5
Burlington	0	------	0	0	0	0	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	10
Massachusetts:											
Boston	1	------	1	63	14	42	0	8	0	97	208
Fall River	1	------	1	0	0	2	0	0	1	12	31
Springfield	0	------	0	0	2	6	0	1	0	1	41
Worcester	0	------	0	72	4	9	0	2	0	0	49
Rhode Island:											
Pawtucket	0	------	0	0	1	1	0	0	0	0	17
Providence	1	------	0	0	2	1	0	0	0	8	70
Connecticut:											
Bridgeport	0	------	0	0	1	4	0	4	0	9	25
Hartford	0	------	0	0	2	2	0	0	0	2	28
New Haven	0	------	0	0	1	12	0	0	0	16	30
New York:											
Buffalo	0	------	0	9	7	5	0	3	0	23	124
New York	11	2	1	386	64	98	0	56	4	180	1,470
Rochester	0	------	0	5	3	1	0	0	1	19	57
Syracuse	0	------	0	0	1	0	0	1	0	14	52
New Jersey:											
Camden	0	------	0	30	1	12	0	0	0	0	33
Newark	0	3	1	9	1	26	0	5	0	26	93
Trenton	0	------	1	1	2	4	0	3	1	6	45
Pennsylvania:											
Philadelphia	0	2	1	317	16	54	0	16	1	102	392
Pittsburgh	8	2	1	4	10	9	0	10	3	37	160
Reading	0	------	0	8	0	0	0	3	0	28	35
Scranton	0	------	--------	1	-------	2	0	-------	0	0	--------
Ohio:											
Cincinnati	1	------	1	2	0	13	0	8	0	10	100
Cleveland	1	19	0	13	7	26	0	6	0	61	185
Columbus	0	------	0	1	4	6	0	2	0	31	89
Toledo	0	1	1	1	3	9	0	6	0	6	95
Indiana:											
Anderson	0	------	0	0	0	0	0	0	0	0	6
Fort Wayne	0	------	0	0	4	0	0	1	0	0	33
Indianapolis	0	------	0	0	6	24	0	7	1	5	100
Muncie	0	------	0	0	1	3	0	0	0	5	6
South Bend	0	------	0	0	1	0	0	0	0	0	16
Terre Haute	1	------	0	0	1	1	0	0	0	0	18
Illinois:											
Alton	0	------	0	0	2	1	0	0	0	0	12
Chicago	12	2	0	319	28	109	0	34	1	99	648
Elgin	1	------	0	0	1	0	0	0	0	0	9
Moline	0	------	0	0	0	0	0	0	0	0	6
Springfield	0	1	0	0	2	5	0	0	0	5	15
Michigan:											
Detroit	2	2	0	374	17	52	0	12	0	180	269
Flint	1	------	0	3	4	3	0	0	0	5	28
Grand Rapids	0	------	0	4	2	4	0	0	0	32	29
Wisconsin:											
Kenosha	0	------	0	0	1	1	0	0	0	1	6
Madison	0	------	0	1	0	5	0	0	0	0	3
Milwaukee	0	------	0	17	20	26	0	1	0	24	96
Racine	0	------	0	0	0	2	0	0	0	0	11
Superior	0	------	0	1	0	6	0	0	0	1	10
Minnesota:											
Duluth	0	------	0	1	0	1	4	0	0	10	20
Minneapolis	0	------	0	8	2	22	1	0	0	23	105
St. Paul	0	------	0	3	4	7	0	1	0	35	58

[1] Figures for Brunswick, Tampa, and Boise estimated; reports not received.

City reports for week ended November 30, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Iowa:											
Cedar Rapids	0			0		5	0		0	0	
Davenport	0			0		2	0		0	0	
Des Moines	2		0	0	0	13	0	0	0	0	43
Sioux City	0			0		5	0		0	4	
Waterloo	0			2		4	0		0	0	
Missouri:											
Kansas City	0		0	6	8	7	0	3	0	33	102
St. Joseph	0		0	0	2	2	0	0	0	0	24
St. Louis	3		0	1	5	23	0	5	1	27	210
North Dakota:											
Fargo	0		0	0	1	2	0	0	0	9	7
Grand Forks	0			0		0	0		0	0	
Minot	1		0	0	0	0	0	0	0	0	4
South Dakota:											
Aberdeen	0			0		2	0		0	0	
Sioux Falls	0		0	0	0	5	0	0	0	0	8
Nebraska:											
Lincoln	1			0		13	0		0	1	
Omaha	0		0	0	5	2	0	2	0	0	183
Kansas:											
Lawrence	0	1		0		0	0		0	0	
Topeka	0		0	0	1	7	0	1	0	6	13
Wichita	0		0	0	3	0	0	0	0	20	39
Delaware:											
Wilmington	0		0	1	2	7	0	1	0	8	26
Maryland:											
Baltimore	2	2	0	1	12	25	0	11	0	93	212
Cumberland	0	1	0	0	1	0	0	0	0	0	13
Frederick	0		0	0	0	0	0	0	0	0	4
Dist. of Col.:											
Washington	0	1	1	1	10	19	0	7	0	10	164
Virginia:											
Lynchburg	4		1	1	1	3	0	0	0	0	16
Norfolk	0		0	1	3	2	0	1	0	1	23
Richmond	2		0	4	1	8	0	2	0	0	44
Roanoke	0		0	5	0	2	0	0	0	10	11
West Virginia:											
Charleston	0		0	0	3	2	0	1	0	0	26
Huntington	0			0		1	0		0	0	
Wheeling	0		0	0	5	2	0	0	0	2	24
North Carolina:											
Gastonia	0			0		1	0		0	0	
Raleigh	0		0	0	1	1	0	0	0	1	9
Wilmington	0		0	0	0	2	0	0	0	0	13
Winston-Salem	0		0	1	0	4	0	0	0	20	14
South Carolina:											
Charleston	0	8	0	6	1	0	0	0	0	0	16
Florence	0	6	0	0	1	0	0	0	0	0	12
Greenville	1		0	0	0	3	0	1	0	1	12
Georgia:											
Atlanta	2	5	1	0	4	3	0	4	1	1	82
Brunswick											
Savannah	0	6	1	2	1	1	0	2	1	0	27
Florida:											
Miami	1	10	0	0	2	3	0	0	0	1	36
Tampa											
Kentucky:											
Ashland	0	2	0	0	0	0	0	0	0	0	5
Covington	0		0	5	0	2	0	2	0	1	20
Lexington	0		0	44	1	0	0	1	0	5	15
Louisville	0	5	1	0	3	12	0	0	0	8	71
Tennessee:											
Knoxville	0		0	1	3	0	0	2	1	1	35
Memphis	1	4	3	3	2	3	0	3	0	1	89
Nashville	3		0	0	1	3	0	1	0	14	41
Alabama:											
Birmingham	2	4	0	8	3	1	0	7	0	5	71
Mobile	0		2	0	2	0	0	1	0	0	28
Montgomery	0			0		3	0	0		1	
Arkansas:											
Fort Smith	0			0		2	0		0	0	
Little Rock	0	1	0	0	2	0	0	3	0	0	13
Louisiana:											
Lake Charles	1		0	0	1	0	0	0	0	3	6
New Orleans	4		0	0	8	4	0	7	0	3	134
Shreveport	1		0	0	2	3	0	0	0	1	52

City reports for week ended November 30, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Oklahoma:											
Oklahoma City	1	------	0	0	3	3	0	1	0	0	39
Tulsa	0	------	0	0	3	3	0	0	0	15	19
Texas:											
Dallas	2	1	1	0	5	3	0	3	2	0	75
Fort Worth	1	------	1	10	3	2	0	1	0	0	51
Galveston	0	------	0	0	0	0	0	0	0	0	15
Houston	4	------	0	0	9	2	0	2	1	0	85
San Antonio	0	9	1	0	4	2	0	5	0	0	54
Montana:											
Billings	0	------	0	0	2	0	0	0	0	0	12
Great Falls	0	------	0	0	1	1	0	0	0	0	9
Helena	0	------	0	0	0	1	0	0	0	0	7
Missoula	0	1	0	0	1	0	0	0	0	0	4
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Colorado Springs	0	------	0	0	0	1	0	1	0	0	14
Denver	2	------	2	47	6	4	0	4	2	13	97
Pueblo	0	------	1	0	2	4	0	1	0	2	10
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	11
Utah:											
Salt Lake City	0	------	1	1	3	2	0	0	0	11	52
Washington:											
Seattle	1	------	0	1	5	3	0	7	0	8	111
Spokane	0	1	0	0	2	1	0	0	0	1	31
Tacoma	0	------	0	3	1	3	0	0	0	10	36
Oregon:											
Portland	2	------	0	0	6	5	0	1	0	0	89
Salem	0	3	------	0	------	0	0	------	0	4	------
California:											
Los Angeles	2	91	3	4	6	18	0	16	0	55	369
Sacramento	4	3	0	0	1	6	0	2	0	7	38
San Francisco	0	358	0	1	5	4	0	6	0	65	179

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
New York:			
Buffalo	1	1	0
New York	2	0	0
New Jersey:			
Trenton	0	0	1
Pennsylvania:			
Philadelphia	1	0	1
Pittsburgh	0	0	2
Ohio:			
Cleveland	0	0	4
Indiana:			
Anderson	0	0	2
Indianapolis	1	0	1
Illinois:			
Chicago	2	0	7
Wisconsin:			
Milwaukee	0	0	2
Minnesota:			
Minneapolis	0	0	1
Iowa:			
Waterloo	1	0	0
Missouri:			
St. Joseph	0	0	1
St. Louis	0	0	2
Kansas:			
Topeka	0	0	4
District of Columbia:			
Washington	0	0	1
Virginia:			
Lynchburg	0	0	1
Louisiana:			
New Orleans	0	0	1
Shreveport	0	1	0
Texas:			
Dallas	0	0	1
Houston	1	0	0

Encephalitis, epidemic or lethargic.—Cases: New York, 2.
Pellagra.—Cases: Atlanta, 1; Birmingham, 1.
Rabies in man.—Deaths: Greenville, S. C., 1.
Typhus fever.—Cases: Richmond, 2; Charleston, S. C., 2; Atlanta, 2; Savannah, 5; Mobile, 1; New Orleans, 3; Fort Worth, 2; Houston, 1; Los Angeles, 2. Deaths: Atlanta, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 16, 1940.—During the week ended November 16, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		2		2	4			1		9
Chickenpox		18	23	241	248	62	61	101	106	860
Diphtheria		33	4	38	2	5	9	2	1	94
Dysentery				1						1
Influenza		18			16				34	68
Lethargic encephalitis					1	1		1		3
Measles		71	7	59	336	117	50	51	77	768
Mumps				31	48	42	1	4	10	136
Pneumonia		15			26	1			9	51
Poliomyelitis									1	1
Scarlet fever		27	5	143	86	8	9	11	33	322
Smallpox							1			1
Trachoma									7	7
Tuberculosis	2	8	11	94	29	3	2			149
Typhoid and paratyphoid fever		1	1	38	7		2		3	52
Whooping cough		21	19	198	135	16	52	11	27	479

SWEDEN

Notifiable diseases—September 1940.—During the month of September 1940, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Diphtheria	23	Scarlet fever	1,229
Dysentery	14	Syphilis	34
Epidemic encephalitis	1	Typhoid fever	9
Gonorrhea	991	Undulant fever	2
Paratyphoid fever	50	Weil's disease	5
Poliomyelitis	82		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of November 29, 1940, pages 2246–2249. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Smallpox

French Guinea.—During the week ended November 30, 1940, 3 cases of smallpox were reported in French Guinea.

Typhus Fever

Tunisia.—During the week ended November 23, 1940, 8 cases of typhus fever were reported in Tunisia.

Yellow Fever

Ivory Coast—Seguela.—On December 3, 1940, 1 suspected case of yellow fever was reported in Seguela, Ivory Coast.

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Public Health Reports

VOLUME 55 DECEMBER 27, 1940 NUMBER 52

IN THIS ISSUE

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

CHARLES V. AKIN, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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CONTENTS

Public Health Reports

Vol. 55 • DECEMBER 27, 1940 • *No. 52*

CHEST FLUOROGRAPHY WITH PORTABLE X-RAY EQUIPMENT ON 35 MM. FILM

By W. PALMER DEARING, *Passed Assistant Surgeon*, and ALEXANDER E. TURNER, *Laboratorian in Roentgenology, United States Public Health Service*

The demonstrations of Edwards (*1*) and others that routine roentgen examination of the chest of unselected adult groups brings to light appreciable numbers of previously unsuspected cases of early treatable and often sputum positive pulmonary tuberculosis have emphasized the need for a diagnostic procedure which is less expensive than the usual radiographic examination. Film cost limits sharply the number of such examinations that can be made. Consequently, the tuberculin test is being widely used in an attempt to select for roentgen examination those who are most likely to have lesions. This test is always refused by a certain portion of the population; another portion is lost through failure to return for one or more readings; even when ideally performed, it is something less than 100 percent selective. Levine (*2*) has reported the finding in many children of tuberculous infiltrations months before allergy develops. The negative reactors, moreover, are at once excluded from the benefits of a chest roentgenogram for demonstration of cardiovascular and nontuberculous pulmonary pathology. A roentgenographic examination which costs no more than a tuberculin test would have the advantage of ready acceptance by the public, the administrative simplicity and economy to the individual of a single instead of two or three clinic visits, and would provide information about chest pathology in every case.

Fluorography is the one procedure that gives promise of accomplishing this objective. By "fluorography" is meant the procedure, suggested by Caldwell in 1911 (*3*), of photographing in miniature with an ordinary camera the roentgen ray shadow on a fluoroscopic screen. Developed first on a practical basis by De Abreu (*4*), it has been widely studied here and abroad, and a number of installations with various combinations of equipment are now in operation. The roentgen spectrum covers so wide a band of wave lengths that the radiation cannot be brought to a point focus by any lens system, and a film size equal to that of the object is necessary for direct radiography. A fluorescent screen, on the other hand, gives off

radiation in the narrow band of the visible spectrum when activated by roentgen rays, and this radiation can be focused. The fact that light intensity decreases inversely with the square of the distance from the source requires that greater power or longer exposure time be used to produce satisfactory films in a camera three feet from the screen.

Potter, Douglas, and Birkelo (*5*) using a Patterson "Fluorazur" screen and a specially constructed lens with 500 milliampere rotating anode X-ray equipment, have already demonstrated in an impressive series that fluorography with 4 by 5-inch X-ray film is sufficiently accurate for survey work. This method, while offering a tremendous saving over full-sized film technique, still requires individual processing and storage of films, and still costs about 10 cents per exposure. The equipment, moreover, in addition to being expensive, is hardly portable. The 35 mm. film used first by De Abreu offers such advantages in processing and storage, as well as economy in film cost and apparatus, that it continues to receive attention. These considerations and the practical immobility of the 4 by 5 apparatus led us to undertake the development, with portable equipment generously loaned by the Westinghouse X-ray Co., of a 35 mm. technique for survey work in rural areas.

THEORETICAL CONSIDERATIONS

1. *X-ray tube.*—Fine detail on either film or screen depends on the nearness to which the anode focal spot, the source of radiation in the tube, approaches a geometric point in size. The principle is similar to that of the pinhole camera, and the smaller the focal spot at a given anode-screen distance or the greater this distance for a given focal spot, the better the definition. Figure 1 illustrates the differences in definition in the shadow of a wire screen, mounted 8 inches in front of the cassette, obtained with three different X-ray tubes at 30- and at 48-inch distances. At 30 inches, the advantage of the 1.2 mm. focal spot is striking; at 48 inches, definition with the larger focus tubes is improved.

2. *Screen.*—Fluorescent "intensifying" screens are responsible for 90 to 95 percent of the density of any radiograph made with a cassette. All chest plates are made in this way. Such plates are actually fluorographs, made in direct contact with, rather than by photographic projection of, the fluorescent image. The belief of many roentgenologists that fluorescent screens show less detail than films is based on the blurring of detail due to afterglow as screen or patient is moved about during fluoroscopic examination, and on physiological inability to see as much contrast in the colored fluorescence as appears in the black and white film.

3. *Lens.*—Lenses with apertures of f 1.5 that will cover the 24 by 32 mm. field of the usual 35 mm. camera are commercially available. The diameter of the circle of confusion of the Leitz Xenon 50 mm. lens has been determined by Bouwers (*6*) to be 20 microns in the center and 30 microns in the extreme corner of such a field. This would permit enlargements of six diameters, or about 6 by 9 inches with no perceptible blurring due to lens unsharpness even in the corners when viewed from a distance of 10 inches. He concludes that the resolving power of the screen and the Xenon lens is great enough to reproduce all the details present in the original radiograph and points out that the loss of light intensity is mainly responsible for the loss in quality of the reduced radiograph.

4. *Film.*—Control of the various film factors of speed (sensitivity), spectrum specificity, contrast, gradation, and size of silver granules is largely empirical. In general, faster emulsions have larger grain size and less contrast; for a given emulsion, over-exposure, powerful developers, and high developing temperatures produce coarser grain than the reverse.

CAMERA UNIT

On the advice of Dr. Johannes Holm [1] of the State Serum Institute, Copenhagen, who has experimented with various screens, a 14 by 17-inch Siemens Supra-Astral screen was procured by the Westinghouse X-Ray Co. for this work. It is without visible grain and gives a greenish-yellow fluorescence. This screen, with the yellow protective covering removed, was mounted in a bakelite cassette with plate-lead glass substituted for the back. This served the double purpose of holding the screen in place and of protecting camera lens and film magazine from direct roentgen radiation. The cassette was mounted in the large end of a light-proof box 34 inches long in the shape of a truncated pyramid. A Leica Model F camera with 50 mm. Xenon f 1.5 lens was mounted outside the small end of the box, which was faced with 0.5 mm. sheet lead as an additional protection against roentgen radiation. The lens projected into the box through a felt-lined aperture, and the camera was held in place by a swivel clamp tightened by a wing nut.

With the camera in place, no light enters the box, and the screen lights up only when roentgen radiation strikes it. In making an exposure, the camera shutter is opened, the patient postured as usual in front of the cassette, and the X-ray tube energized for an appropriate time. This causes the screen to light up with the shadow of the chest, which is recorded on the film. When the radiation ceases, the screen becomes dark; the film is advanced, and the apparatus is ready for the next exposure.

[1] Personal communication, March 1939.

Since the standard Xenon lens mount will not permit focusing on objects closer than 42 inches, a steel ring was specially cut by the Leitz Company to provide sufficient extension to focus at 34 inches, at which distance the 14-inch dimension of the screen fills the width of the film field. The proper lens setting for critical focus was determined by stringing fine copper wire across the front of the cassette, making a series of exposures with various lens settings, and selecting the one which best resolved the images of the wire. The entire assembly is supported by a counterbalanced cable in a demountable 2 by 2-inch wooden frame. Wing nuts lock the apparatus at any desired height (see fig. 2).

TECHNIQUES AND MATERIALS

Over 1,500 persons have been examined with both conventional and micro-films. Since it is not feasible to describe all combinations of materials and techniques that have been tried, only salient factors will be discussed, and results will be presented rather empirically.

1. *X-ray units.*—The limitations both as to quantity and stability of commercially available power in schools, civic buildings, and county health department quarters made an X-ray unit operated by condenser discharge seem particularly attractive. In this type of unit the current which actually energizes the tube is stored in condensers and released at the proper time, rather than furnished directly by a transformer system. High milliamperages with consequent short exposure times and uniform film density out to the margins can be obtained with current from an ordinary lamp socket.

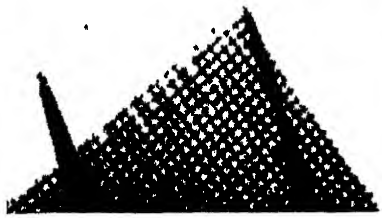
Several different types of X-ray equipment were tried and their results compared in order to select the most suitable apparatus for routine use. The Westinghouse X-Ray Co. loaned a "portable" condenser discharge unit, their "Dynex A," for trial. However, satisfactory film density and contrast were not obtained.

Two conventional type self-rectified mobile units—the 100-milliampere unit with 4.2 mm. focal spot (General Electric model R 36) of the Division of Tuberculosis of the Florida State Health Department, and a 30-milliampere unit with 3.0 mm. focal spot (Westinghouse Diadex) identical with that used in field diagnostic clinics by the Alabama State Health Department—were therefore compared. It was found that the larger unit sacrificed as much by the use of a 4.2 mm. focal spot as was gained by the reduction in time or increase in distance permitted with the higher power. The 30-milliampere "Diadex" proved most satisfactory for our purposes.

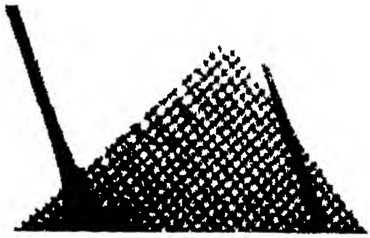
Anode screen distances of 28, 30, and 32 inches have been tried. These short distances require care in positioning of patient and centering of tube; a slight error in centering on a normal chest gave the appearance in fig. 3*a*.

Anode-screen distance 30″

Anode-screen distance 48″



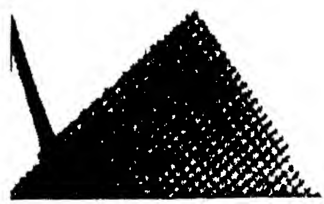
No 1



No 2

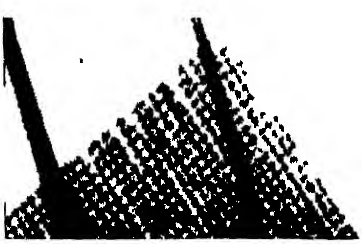
Fine focus tube (1 2 mm).

No 3

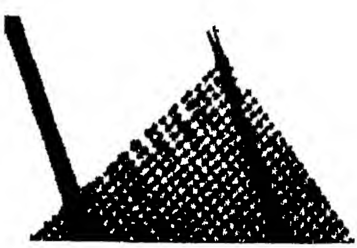


No 4

Medium focus tube (3 0 mm)



No 5



No 6

Broad focus tube (4 2 mm).

FIGURE 1 —Effect of X-ray tube focal spot size and anode-screen distance on radiographic detail

FIGURE 2 —Camera unit and Westinghouse "Diadex" portable X-ray

Fluorographs made with portable unit

FIGURE 3a.—Normal chest with tube not centered, creating suspicious shadow on right

FIGURE 3b.—Calcified pleura resembling pneumonic infiltration.

FIGURE 3c.—Reinfection type tuberculosis, right apex with strand in second interspace, calcification in second left interspace and left hilum

Fluorographs made with portable unit

FIGURE 3*d*.—Probable first infection type lesion with calcification in both lung fields and hila.

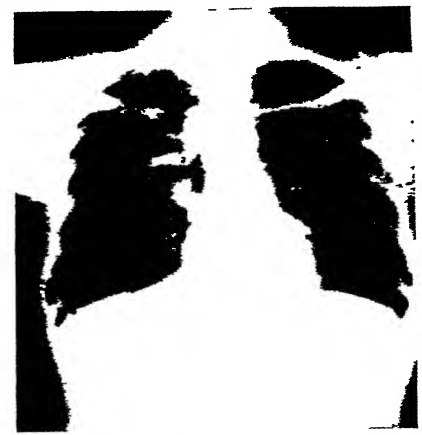


FIGURE 3*e*.—Artificial pneumothorax with some spread of disease to opposite midzone.

2. *Films and developers.*—One of us, working with R. D. Reed, photographer for the National Institute of Health, tested out the following developers on fast commercial films: Agfa 17, 47, 70, 72, and 79; Eastman D 19, D 76, and X-ray developer; Edwall 12.

Agfa 17 with a normal development time of 15 minutes gave the best results when the time was increased to 30 minutes. Eastman X-ray developer diluted one part to two of water also gave good negatives after 15 minutes' development. Agfa 70 gave good contrast but excessive grain. Results with the fastest commercial films were, however, not entirely satisfactory.

Within the past few months, both Agfa and Eastman have developed new emulsions especially sensitized to the spectra of fluorescent screens and have kindly furnished us a sample for trial. The Agfa "Fluorapid" emulsion was first available and was tried both on sanatorium cases and in field examinations with the most gratifying results yet obtained. Other than the use of this specially sensitized film, routine procedures and developers, if followed by a chrome alum hardening bath, gave satisfactory results. This chrome alum sodium bisulfite hardener shrinks and toughens the emulsion, remarkably increasing resistance to dust and scratches. Its use is indispensable on film subject to the manipulation of reading and review.

3. *Reading.*—Although gross lesions can be identified in the small film, the films must be enlarged, either by direct magnification or projection, for detailed reading. It is not, however, necessary to magnify or project to the original size. Roentgenologists have grown accustomed to reading large films because no reduction in size is possible without the fluorographic technique. Actually, reduced films are often easier to interpret because the entire chest area can be visualized at one time. This results in a tendency observed by both Potter (*5*) and the authors to grade lesions as more severe in reduced than in regular films. Reliable interpretation of miniature films requires some experience.

Since no screen can reflect the complete gradation of the original film, direct magnification is preferable to projection. The development of reading devices is being carried on independently by several manufacturers, and improved units are now appearing on the commercial market. Our procedure has been to place the film in a Leica "removable 35 mm. film strip attachment" (Catalog No. 75460), equipped with window and spools, and examine by transmitted light with a 4-inch lens. A 2-inch lens is occasionally used when greater magnification is desired.

4. *Radiographic technique.*—When portable X-ray equipment is used in the field, differences in wiring and current supply from place to place introduce additional variables into the standard technique employed with permanent

milliamperage is always used and may vary from 15 to 30, requiring that exposure time be varied, in addition to the usual variation of kilovoltage according to thickness. For chests measuring less than 20 centimeters, 12 to 15 milliampere seconds are used, with increase up to 20 for larger chests.

The factors may be summarized as follows:

a. Distance: 30 inches from anode to screen.
b. Effective kilovoltage: Three times the chest measurement in centimeters.
c. Exposure time: ½ second unless poor current requires increase to obtain sufficient milliampere seconds.

FIELD EXAMINATIONS

In cooperation with the Tennessee State Department of Public Health, 121 cases and family contacts were examined by both regular and 35 mm. film. The films were made in six different county health department clinics where the usual current variations were encountered.

On the first 33 cases, only a single micro-film was made; on the remaining 88, two films were made on each case with the tube lowered 2 inches for the second exposure. There were 5 tuberculous lesions demonstrated by regular film among the first series of 33 examinations, 1 of which was first overlooked in the somewhat overexposed micro-film. This was a minimal lesion faintly visible on review.

The results of independent examination by two readers of the 88 films in the second series are set forth in the following table:

Comparison of 88 micro and regular roentgenograms

	Regular film	Missed on micro-film	
		Reader 1	Reader 2
Childhood tuberculosis	2	0	0
Reinfection tuberculosis:			
Latent apical	2	1	1
Minimal	7	2	2
Moderate	1	0	0
Far advanced	7	0	0
Suspected	3	0	0
Total positive	22	3	3
Negative	66	2	7
Total	88	5	10
Percent missed		5.7	11.4
Calcification:			
Positive	29	10	3
Negative	59	0	2
Total	88	10	5
Percent missed		11.4	5.7

Reader 1, although comparatively inexperienced in radiographic interpretation, had the benefit of previous experience with micro-film and reported fewer false positives. Reader 2 has had years of experience in chest diagnostic work, read calcification more accurately than Reader 1, and with a little experience would probably also better his score on significant pathology.

Actually, only one of the three reinfection type lesions missed in this series appeared from the regular film to be clinically significant. The latent apical and the other minimal lesion were considered of doubtful or no significance.

DISCUSSION

These results, particularly from the standpoint of clinical significance, are definitely encouraging. Additional refinement of technique to compensate for variations in milliamperage should produce better and more uniform pictures. Experience in reading the small films is necessary and will reduce errors in interpretation (*7*). The routine used by Holm (see footnote 1) of making two films at different tube levels on each patient will bring all the lung fields into the interspaces in one or the other exposure, and, with little added expense, eliminate a long recognized source of error in single plate examinations.

Radiographic technique is made up of compromises. Shortening anode-screen distance reduces exposure time but increases distortion and reduces definition; reducing the size of the anode focal spot gives better detail but reduces the power that can be used. Raising voltage increases penetrating power of the rays, but reduces contrast in the resulting film.

Experience with low-powered portable equipment in the rural South where none other is available to most of the population indicates that the importance of extremely short exposure times in routine chest radiography has been overemphasized. The heart border and adjacent structures are, of course, blurred in exposures of ½ to 1 second, but significant shadows in that area are rare and when present are usually sufficiently recognized so that the person is at least called back for reexamination. The greater detail brought out by the high-powered equipment and short exposures undoubtedly permits refinement of differential diagnosis but adds little to the value of the roentgenogram as a screen to select individuals with unsuspected pathology. The timely article of Spillman (*8*) emphasizes the paramount importance of intelligent experience in any radiographic work, regardless of the type of equipment used.

As pointed out by Exner (*9*) in an admirable discussion of the problems of roentgen diagnosis of chest pathology, there is a tendency prevalent among roentgenologists to go beyond objective interpretation and to read pathology, diagnosis, and prognosis into nonspecific

shadows. In mass surveys where little or no clinical information is at hand on the individual case, the interpretation must be both objective and conservative as to definitive diagnosis. The function of such surveys should be to single out for diagnosis and treatment individuals with hidden pathology that may be of consequence to themselves and the community. Differential diagnosis, including the tuberculin test, stereoscopic and oblique X-rays, should *follow* the screening procedure.

The paramount place of the X-ray in mass screening is also emphasized by Reid (*10*), who summarizes the experience of the Metropolitan Life Insurance Company with preemployment examinations. Of 200 clinically significant cases of reinfection type tuberculosis among 25,000 white applicants, 137 or 68.5 percent were discovered only by means of X-ray, after history and physical examination had failed to indicate pathology. Fluoroscopic screening in these examinations was calculated to lack about 13 percent of the accuracy of the full sized radiograph, but is being continued by the company as a useful, practical, economically feasible procedure. In like manner, fluorography is presented, not as a perfected method for final diagnosis, but as a practical procedure, worthy of consideration and further development, for bringing the advantages of X-ray examination to communities and individuals which would otherwise be passed by.

CONCLUSION

Although there is need for further development of techniques and materials, fluorography with 35 mm. film and portable X-ray equipment offers promise as a practicable procedure for screening purposes and for large-scale tuberculosis case finding in rural areas at reasonable cost.

ACKNOWLEDGMENTS

It is desired to acknowledge with special thanks the help and advice of Mr. F. P. Meredith of the Westinghouse X-Ray Co. in technical matters, of Dr. R. S. Gass of the Tennessee State Department of Public Health in reviewing comparative series of films, of Dr. Norman Van Wezel of the Montgomery County Tuberculosis Sanatorium in providing space and selecting patients for examination, of Dr. A. J. Logie and Mr. James Morehouse of the Florida State Health Department in making the study with their 100-milliampere unit, and of the patients and personnel at the Montgomery County Sanatorium and of county health departments in Alabama, Tennessee, and Florida in aiding the study. The courtesy of the Eastman and Agfa-Ansco companies in furnishing film for trial is also acknowledged. Finally, special thanks are due the Westinghouse X-ray Co. whose unstinting provision of equipment has made this work possible.

REFERENCES

(1) Edwards, H. R.: Tuberculosis case findings, studies in mass surveys. Am. Rev. Tuberc., Supplement 41 (June 1940).
(2) Levine, Milton I.: Sequence of roentgen evidence of tuberculosis and cutaneous sensitivity to tuberculin. A study of infants. Am. J. Dis. Child., 58: 799 (1939).
(3) Caldwell: Quoted by Hirsch, I. S. *in* Fluorography—The photography of the fluorescent image. Am. J. Roent. and Rad. Therap., 43: 45 (January 1940).
(4) De Abreu, Manoel: Collective fluorography. Radiology, 33: 363 (September 1939).
(5) Potter, H. E., Douglas, Bruce H., and Birkelo, Carl C.: The miniature X-ray chest film. Radiology, 34: 283 (March 1940).
(6) Bouwers, A.: The indirect radiograph. Radiology, 33: 357 (September 1939).
(7) Bridge, Ezra: Case finding with fluoroscopic roentgenography. Am. Rev. Tuberc, 42: 155 (August 1940).
(8) Spillman, Ramsay: The value of radiography in detecting tuberculosis in recruits. J. Am. Med. Assoc., 115: 1371 (Oct. 19, 1940).
(9) Exner, Frederick B.: Roentgen examination in diagnosis of pulmonary tuberculosis. Northwest Med., 38: 327 (September 1939).
(10) Reid, Ada C.: Pulmonary tuberculosis in applicants for employment. J. Indust. Hyg. and Toxicol., 22: 303 (October 1940).

QUALIFICATIONS OF PROFESSIONAL PUBLIC HEALTH PERSONNEL [1]

II. HEALTH OFFICERS AND OTHER MEDICAL PERSONNEL

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The medical profession furnishes much of the leadership in the field of public health. Not only do physicians in health departments render or supervise all medical services, but, as health officers, in almost all departments, they plan and administer the entire program.

For efficient service to the public, therefore, it is essential that these responsible positions be held by men and women who are not only well qualified in the sciences and the art of medicine, but also prepared by additional instruction in the specialty of public health, its problems and techniques. It is the purpose of this paper to present findings as to the training and experience of health officers and other medical workers now in service, as revealed by the questionnaire survey conducted recently by the Public Health Service.[2]

[1] From Division of Public Health Methods, National Institute of Health. This is the second in the series· Qualifications of Professional Public Health Personnel. The first paper, I. Plan and Scope of the Survey, was published in the Public Health Reports, 55: 2312 (1940).

This survey was made possible through the cooperation of State and local health officers and members of their staffs throughout the country. Assistance in the preparation of these materials was furnished by the personnel of the Works Progress Administration, Official Project No. 765-23-3-2.

[2] Complete details on the scope and plan of the survey are given in the first paper of this series.

Among the 16,670 full-time public health workers who submitted schedules, 2,076 are members of the medical profession. However, only 1,956 of that number are employed in strictly medical tasks. Some work in sanitary corps, others direct or work in laboratories or are health educators. Inasmuch as each individual is classified for the analysis according to his function rather than his profession, this report is concerned with the 1,956 physicians who are health officers or perform other tasks that are primarily medical. Because of similarity of function, the 89 nonmedical health officers who submitted schedules are included for the analysis with the other health officers, and summarized information for them will be included in the tables wherever it is feasible to do so.

ADMINISTRATIVE CLASSIFICATION OF PHYSICIANS

Using administrative responsibility as a basis, the physicians reporting have been roughly divided into three categories: (*a*) Health officers, (*b*) administrative physicians, i. e., deputy health officers, bureau directors and others with some administrative responsibility, and (*c*) staff physicians.[3] The number in each category in each of the types of jurisdictions appears in table 1.

TABLE 1.—*Health officers and other medical personnel in 1,114 jurisdictions, by type of jurisdiction and classification of position*

Jurisdiction	All physicians		Medical health officers		Administrative physicians		Staff physicians		Nonmedical health officers
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
Total	1,956	100.0	947	48.4	570	29.6	430	22.0	89
State	487	100.0	39	8.0	302	62.0	146	30.0	
County	951	100.0	771	81.0	146	15.4	34	3.6	1
City	518	100.0	137	26.4	131	25.3	250	48.3	88

Out of 1,114 jurisdictions, schedules were obtained from only 1,036 health officers. This was somewhat surprising since information was collected only from jurisdictions with full-time executive heads; but a number of health officers who sent schedules for other members of their staffs failed to send their own. All such cases were routinely followed up in an attempt to complete the data, but in a number of instances the effort was not successful. In a few cases the position of health officer was vacant or the incumbent was temporarily in training, on leave, or away for some other reason.

[3] Among staff physicians are the following titles: Clinic physician; epidemiologist, immunologist, or malariologist (if not a bureau director); medical inspector; pediatrician; health officer trainee; city physician; and school physician.

It is significant that cities employ 88 of the 89 nonmedical health officers reporting. Seventy-three of them are in 3 States in which nonmedical health officers serve two-thirds of the city jurisdictions reporting.

The number of staff physicians about whom data were obtained is relatively small because in many departments staff physicians rendering direct service are part-time workers, and, therefore, are excluded from consideration in this study. Cities have more full-time staff physicians than either the States or counties, probably owing to the high concentration of problems in a small administrative area. States, on the other hand, employ a relatively large number of administrative physicians to direct specific medical services and act as consultants to local health departments.

Four-fifths of the full-time physicians in the counties are health officers. This is to be expected because of the prevalence of relatively small county units in which the only medically trained employee not only serves as administrator but also conducts the medical functions of the department, sometimes assisted by part-time personnel.

Medical workers in public health are predominantly white males. Only 102 women physicians submitted schedules. Since, however, the relative number of women physicians is small, this disproportion is to be expected. Nine of the women are health officers. Of the remainder, approximately half are occupying administrative positions. Five nonmedical health officers are women.

AGE

The distribution of each of the categories of personnel by age appears in table 2. Health officers are the oldest group and staff physicians the youngest, although the differences are relatively small. The outstanding fact in the table, however, is that nonmedical health officers are much older than any of the groups of physicians. In addition to being an average of 6 years older than the other health officers, it may be pointed out that 61 percent are at least 50 years old, whereas only 42 percent of medical health officers, the oldest physicians, have attained that age.

TABLE 2.—*Health officers and other medical personnel by age*

Age, years	All physicians	Medical health officers	Administrative physicians	Staff physicians	Nonmedical health officers
	Number				
All ages	1,956	947	579	430	89
25-29	188	77	63	48	2
30-34	378	178	117	83	4
35-39	302	120	104	78	5
40-44	214	80	66	68	10
45-49	179	85	46	48	12
50-54	172	94	51	27	20
55-59	207	120	54	33	8
60-64	150	86	40	24	11
65 and over	149	98	32	19	15
Unknown	17	9	6	2	2
Average, years	44.7	46.6	43.4	42.5	52.6
	Percentage				
All ages	100.0	100.0	100.0	100.0	100.0
25-29	9.6	8.1	10.9	11.2	2.2
30-34	19.3	18.8	20.2	19.3	4.5
35-39	15.4	12.7	18.0	18.0	5.6
40-44	10.9	8.4	11.4	15.8	11.2
45-49	9.2	9.0	8.0	11.2	13.5
50-54	8.8	9.9	8.8	6.3	22.5
55-59	10.6	12.7	9.3	7.7	9.0
60-64	7.7	9.1	6.9	5.6	12.4
65 and over	7.6	10.3	5.5	4.4	16.9
Unknown	.9	1.0	1.0	.5	2.2

EDUCATIONAL QUALIFICATIONS

ACADEMIC TRAINING

Within the memory of many public health workers, a student desiring to become a physician could proceed directly to professional school after high school graduation or in some instances could take professional training before completing high school. More recently, medical schools have required prospective students to have a certain minimum of academic college work before admitting them to professional training. These changes in entrance requirements are recognized; but, since in our sampling the number who did not report high school graduation prior to entrance to professional school is extremely small, no tabulations of high school training have been made.[4] The analysis of academic training is, therefore, limited to collegiate work.

The academic preparation reported by health officers and other medically trained public health workers is shown in table 3. Each individual is tabulated at the highest level of training he has attained; for example, physicians reporting graduate academic work are as-

[4] Since among schedules submitted by physicians, a number not reporting graduation from high school seemed to be incomplete in other respects, it is believed the recording was faulty. The resultant error is small.

sumed to have completed undergraduate study and those having degrees are tabulated at that level regardless of the number of years of study reported. In academic preparation, administrative physicians rank first, staff physicians second, and health officers last; but there is little difference between the levels of training attained by the two latter groups. Half the medical personnel have had enough academic training to get at least a bachelor's degree; 8 percent have taken graduate academic work. One-fifth of the total report no academic college work; the remainder have had a year or more.

The proportion of physicians without academic college training is approximately that reported in the 1930 survey by the White House Conference,[5] but the proportion with 4 years or more of such training has doubled since 1930. It would appear, therefore, that public health physicians now in service have, as a whole, a considerably higher level of basic educational attainment than did those reporting 10 years ago.

TABLE 3.—*Levels of academic training reported by health officers and other medical personnel*

Level of academic training reported	All physicians	Medical health officers	Administrative physicians	Staff physicians	Nonmedical health officers
	Number				
Total	1,956	947	579	430	89
No academic college	396	222	95	79	63
1-2 years, no degree	368	182	100	86	10
3-5 years, no degree	218	110	52	56	4
Bachelor's degree, no graduate training	819	360	279	180	7
Graduate training	155	73	53	29	5
Less than 1 year	10	6	2	2	------------
1 year but not 2 years	59	29	17	13	1
2 years or more	69	32	25	12	4
Unknown amount	17	6	9	2	------------
	Percentage				
Total	100.0	100.0	100.0	100.0	100.0
No academic college	20.3	23.5	16.4	18.4	70.8
1-2 years, no degree	18.8	19.2	17.3	20.0	11.2
3-5 years, no degree	11.1	11.6	9.0	13.0	4.5
Bachelor's degree, no graduate training	41.9	38.0	48.2	41.9	7.9
Graduate training	7.9	7.7	9.1	6.7	5.6
Less than 1 year	.5	.6	.3	.5	------------
1 year but not 2 years	3.0	3.1	2.9	3.0	1.1
2 years or more	3.5	3.4	4.3	2.7	4.5
Unknown amount	.9	.6	1.6	.5	------------

In contrast to the medical personnel, nonmedical health officers are conspicuously poorly trained. Almost three-fourths of them have had no academic college education, and only 13 percent have academic degrees. The lack of fundamental education among these workers

[5] The tables summarizing the White House Conference survey are difficult to interpret, inasmuch as 18.8 percent of the personnel reporting did not specify the amount of college training. If it is assumed that the majority of these are without college training, the superiority of the training level of the present personnel is more apparent.

is even more striking when one considers that all physicians have professional training in addition to their academic work but few nonmedical health officers have any professional training (see tables 4 and 5).

When training is analyzed by jurisdiction, it is found that city employees have much less training than those in the States and counties. The difference is particularly striking when the nonmedical health officers, almost all of whom are in cities, are included with the other city personnel. State health department physicians have more training than those in counties, but this is largely accounted for by the excess, in State health departments, of administrative physicians who have more academic training than the other groups.

PROFESSIONAL TRAINING

In addition to their academic education, four-fifths of the medical personnel have had 4 years of professional training, with a small proportion reporting less, and approximately the same proportion more than 4 years (table 4).

TABLE 4.—*Professional training*[1] *reported by health officers and other medical personnel*

Years of professional training reported	All physicians	Medical health officers	Administrative physicians	Staff physicians	Nonmedical health officers
	Number				
Total	1,956	947	579	430	89
None					[2] 65
1					5
2	24	17	3	4	2
3	96	63	21	12	9
4	1,594	746	488	360	3
5	47	20	20	7	1
6 or more	51	23	15	13	
Unspecified	144	78	32	34	4
	Percentage				
Total	100.0	100.0	100.0	100.0	100.0
None					73.1
1					5.6
2	1.2	1.8	0.5	0.9	2.2
3	4.9	6.7	3.6	2.8	10.1
4	81.5	78.8	84.3	83.8	3.4
5	2.4	2.1	3.5	1.6	1.1
6 or more	2.6	2.4	2.6	3.0	
Unspecified	7.4	8.2	5.5	7.9	4.5

[1] Exclusive of training in nursing or public health.
[2] Includes 24 whose only professional training is in public health.

Again, nonmedical health officers are conspicuous for their lack of training. The majority of those that have had any professional education have had less than 4 years. Furthermore, the kind of training taken varies widely, including preparation for employment in such

fields as engineering, nursing, and veterinary medicine. The group with no professional training includes 24 who have had some public health training, details of which will be shown in table 6.

TOTAL YEARS OF TRAINING

Educational attainment was not always reported in the same way, partly because of individual interpretations of the schedule and partly because of different methods of assigning credits in schools and colleges. In order to portray the total length of training, "years of academic education" has been combined with "years of professional training" for each individual, with the result shown in table 5. In a few instances individuals are tabulated as having more training than they have actually received, because a bachelor's degree was uniformly credited as the equivalent of 4 years of academic training. This unavoidable error, however, applies chiefly to physicians who took only 3 years of academic work but were granted bachelor's degrees after successful completion of the first year of a subsequent professional course.

TABLE 5.—*Aggregate years of college training, both academic and professional,*[1] *reported by health officers and other medical personnel*

Aggregate years of training of college level	All physicians	Medical health officers	Administrative physicians	Staff physicians	Nonmedical health officers
	Number				
Total	1,956	947	579	430	89
None					24
1					2
2	8	7		1	10
3	40	32	5	3	11
4	262	144	62	56	9
5	85	42	23	20	2
6	275	130	79	66	3
7	193	95	53	45	
8	800	351	271	178	2
9	74	38	21	15	
10 or more	68	29	27	12	
Unspecified	151	79	38	34	26
	Percentage				
Total	100.0	100.0	100.0	100.0	100.0
None					27.0
1					2.2
2	0.4	0.7		0.2	11.2
3	2.0	3.4	0.9	.7	12.4
4	13.4	15.2	10.7	13.0	10.1
5	4.3	4.4	4.0	4.7	2.2
6	14.1	13.7	13.6	15.3	3.4
7	9.9	10.0	9.1	10.5	
8	40.9	37.1	46.8	41.4	2.2
9	3.8	4.0	3.6	3.5	
10 or more	3.5	3.1	4.7	2.8	
Unspecified	7.7	8.4	6.6	7.9	29.3

[1] Exclusive of public health and nursing.

As has appeared in previous tables, nonmedical health officers are, on the whole, lacking in both academic and professional training.[6] All but 48 of the 1,956 physicians report at least 4 years of training. Almost half of them have had at least 8 years of education beyond high school; three-fourths have had 6 years or more. It is obvious that, insofar as the amount of college and professional education received can be used as a criterion, practically all physicians in health departments have good basic training.[7]

PUBLIC HEALTH TRAINING

The amount of specific training in public health is, however, of greater importance to the quality of service rendered than general educational background. Table 6, summarizing the extent of such training, is constructed in the manner used in previous tables on education in that individuals are tabulated at the highest level attained. It is, however, not correct to assume in this case that a person tabulated at a given level of public health training has necessarily had preparation or instruction comparable with that of all others similarly tabulated. Not only have public health training institutions not stabilized hierarchies of training such as are found in the academic field, but it is also highly probable that at least a part of the instruction in public health shown in the table was not given by recognized public health training schools. In the emergency effort to improve the character of health service within the past few years, short special courses in the field or under State auspices have grown in popularity. Such courses do not, however, fit into the usual educational pyramid. In the table, therefore, preference has been given to instruction designated as graduate public health training.

Almost half the physicians in official agencies have had no training in public health. An additional quarter have had only "special" courses, that is, largely in-service training. In this connection it should be pointed out that persons reporting attendance at "short-term" courses in graduate public health training schools were not tabulated in the "special" courses category, whenever the institution and course were identifiable. Instead, they were included in the group having graduate public health training and given credit for the length of the course taken.

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[6] Five nonmedical health officers are veterinarians, 2 have degrees in law, 2, in engineering, 1, in dentistry; and 1, in pharmacy.

[7] In addition to their medical degrees, small groups of physicians have other professional degrees. The largest of these groups, 40 in all, reported degrees in pharmacy. Others have degrees in surgery, dentistry, veterinary medicine, law, and engineering.

TABLE 6.—*Public health training reported by health officers and other medical personnel*

Graduate public health training reported	All physicians	Medical health officers	Administrative physicians	Staff physicians	Nonmedical health officers
	Number				
Total	1,956	947	579	430	89
None	907	321	256	330	58
Special courses only	461	281	129	51	24
Less than 1 year	184	138	37	9	----
1 year	342	175	132	35	1
2 years or more	62	32	25	5	6
Certificate in public health	267	156	91	20	4
Bachelor of science in public health	1	----	1	----	----
Diploma in public health	7	5	2	----	----
Master's degree in public health	87	40	38	9	----
Doctorate in public health [1]	65	34	28	3	1
	Percentage				
Total	100.0	100.0	100.0	100.0	100.0
None	46.4	33.9	44.2	76.7	65.2
Special courses only	23.5	29.7	22.3	11.9	27.0
Less than 1 year	9.4	14.6	6.4	2.1	----
1 year	17.5	18.5	22.8	8.1	1.1
2 years or more	3.2	3.3	4.3	1.2	6.7
Certificate in public health	13.7	16.5	15.7	4.7	4.5
Bachelor of science in public health	(2)	----	0.2	----	----
Diploma in public health	0.4	0.5	0.3	----	----
Master's degree in public health	4.4	4.2	6.6	2.1	----
Doctorate in public health [1]	3.3	3.6	4.8	0.7	1.1

3 physicians with doctorates in public health each have a Ph. D. or D. Sc. with a major in public health.
[2] Less than 0.1 percent.

One physician in five has had as much as a year's training in public health—the amount recommended by the Committee on Professional Education of the American Public Health Association.[8] Only 8 percent have public health degrees; an additional 14 percent have certificates in public health.

It is encouraging to compare these findings with those of the White House Conference in 1930. There are now relatively twice as many workers with a year or more of public health training as there were then. On the other hand, the proportion reporting no public health training (46 percent) is almost the same now as in 1930 (49 percent).

Comparisons of the two bodies of data are limited by the fact that 17.9 percent of those reporting in the White House Conference survey did not specify the amount of public health training they had. If, as is most likely, a major portion of these had no training, then the improvement over 1930 is greater than these figures show.

Medical health officers report the smallest relative number of untrained workers, but, unfortunately, many of them have had only special courses; the proportion in this category is higher for health

[8] The Educational Qualifications of Health Officers, Committee Report. Am. J. Pub. Health, 29; 1342-43 (December 1939).

officers than for any other group. Although almost half the administrative physicians have had no training, that group also has the largest proportion with one or more years of training and consequently the largest relative number of certificates or degrees.

Three-fourths of the staff physicians have had no public health training and fewer than 10 percent report as much as one year. It is true that many of the staff physicians are serving in child-health stations, schools, and clinics; and, therefore, their lack of public health training is much less of a detriment to efficient service than it otherwise might be. There is, however, little doubt that they would profit from the more comprehensive knowledge of the principles of public health to be obtained from specific training in the profession.

Nonmedical health officers appear no better prepared in public health than in the academic and professional fields. Out of the 89 reporting, only 7 have had as much as a year of public health training. Twenty-four others have had some in-service training but 58, or almost two-thirds of the total, have had no training in the field in which they are working.

At the bottom of table 6 is a summary of degrees and certificates in public health held by the various classes of physicians. As Meleney has said, "While the mere possession or lack of a professional degree cannot be taken as a measure of * * * efficiency * * *, it does give some indication of the extent of * * * accredited educational equipment." [9] Although the number holding degrees is relatively small (fewer than 9 percent of the total), there is, nevertheless, considerable variety in the types reported. Not all the degrees shown are strictly comparable since the requirements for the various degrees differ widely among schools. The questionnaire by which these data were collected did not request that individuals report schools from which they had obtained degrees or other evidences of educational attainment. However, even if all public health degrees and certificates held by health department physicians were from schools recognized as outstanding, the relative number of degree holders in any of the categories is smaller than is compatible with a staff adequately trained to render an efficient service.

When the data are classified according to type of jurisdiction in which the physicians are employed (table 7), it is apparent that physicians in city health departments have far less training than those in State or county departments. The great differences between jurisdictional groups is partly accounted for by the relatively high proportion of staff physicians in cities, coupled with the fact that 85 percent of city staff workers have had no public health training. However, lack of training in public health is also characteristic of each of the

[9] Certain Criteria on the Qualifications and Preparation of Health Officers, by Henry E Meleney Am J. Pub Health, 28 423–429 (April 1938) The quotation is from p 424

other administrative classes of city personnel. Although health department physicians, as a class, need additional public health training, those in city departments appear to need it most.

TABLE 7.—*Public health training reported by physicians and nonmedical health officers, by type of employing jurisdiction*

Graduate public health training reported	Physicians				City nonmedical health officers [1]
	Total	State	County	City	
	Number				
Total	1,956	487	951	518	89
None	907	230	298	379	58
Special courses only	461	86	306	69	24
Less than 1 year	184	34	141	9	----------
1 year	342	118	180	44	1
2 years or more	62	19	26	17	6
Certificate granted	267	74	166	27	4
Degree granted	160	62	68	30	1
	Percentage				
Total	100.0	100.0	100.0	100.0	100.0
None	46.4	47.2	31.3	73.2	65.2
Special courses only	23.5	17.7	32.2	13.3	27.0
Less than 1 year	9.4	7.0	14.9	1.7	----------
1 year	17.5	24.2	18.9	8.5	1.1
2 years or more	3.2	3.9	2.7	3.3	6.7
Certificate granted	13.7	15.2	17.5	5.2	4.5
Degree granted	8.2	12.7	7.2	5.8	1.1

[1] One is a county health officer (with no training in public health).

In an effort to overcome the lack of public health training among personnel currently employed, the Social Security Act provided funds from which stipends and fellowships could be granted to workers for postgraduate study in public health. That this provision has stimulated the movement toward a better trained personnel is evidenced by a comparison of the training of physicians appointed to their present positions since 1935, with that of physicians who have worked in their present jurisdictions 3 years or more. Such a separation does not altogether limit the first group to those who have just entered public health work, since a mere change in locality was classified as a "change of position" even though the individual might still work under the same State organization. Nevertheless, the data indicate that physicians recently employed are better trained than are those employed in their present jurisdictions prior to 1935.

Twenty-six percent of the newly employed group have public health certificates or degrees; 41 percent have had no public health training. Among the older group, only 19 percent have such certificates or degrees and 52 percent are without training. This difference between those recently employed and those with longer experience is most

marked in city health departments, although the relative number of new employees is small. Among older physicians in city jurisdictions only 7 percent have public health certificates or degrees; among those most recently employed 20 percent have such certificates or degrees. The effect of the funds is further shown by the fact that 67.9 percent of the degrees granted between 1935 and 1938 to health officers and administrative physicians were in public health, compared to only

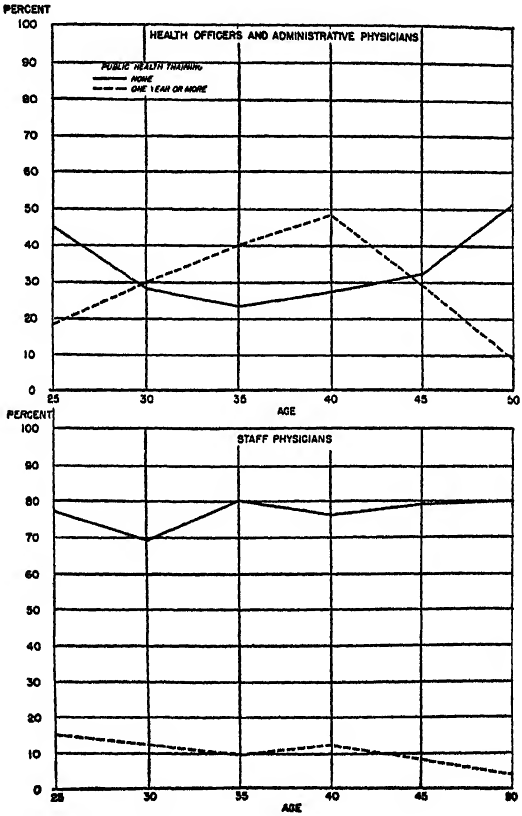

FIGURE 1.—Public health training of health department physicians—percentages of age groups with specified public health training. (In this figure age 25 equals 25–29, 30 equals 30–34, etc.)

28.1 percent of degrees in public health during the preceding 3-year period.

Although the data on workers recently employed in their present positions show a trend toward the appointment of trained individuals, analyzing levels of training by age of worker (see figure 1) indicates that many of the youngest physicians had had no public health training in the latter months of 1938. Almost half of the health officers and administrative physicians under 30 report no formal public health training. This proportion is higher than for any other age group

except the oldest, age 50 or over. Only 18 percent of the young administrators under 30 had had as much as one year of public health training, a proportion smaller than for any other age group except the oldest. This may reflect the tendency in many health departments to appoint young men for a period of orientation and observation before investing in their training. Among staff physicians, the proportion of those under 30 with no training is approximately the same as for any other age group. There is, however, an indication that relatively more of the young staff physicians than of the older ones had had at least one year of training.

EMPLOYMENT EXPERIENCE

Training in the specialized field of public health is only one qualification for carrying on an effective public health job. A new employee's previous work experience often assists in equipping him for his duties. Furthermore, consistency of employment in public health may be some index of the degree to which the field is chosen as a profession rather than accepted as a job to be left if some other opportunity offers itself.

For these reasons, the present survey requested data on the employment experience of each individual. The items on the questionnaire included: (*a*) Title of each position held; (*b*) name and address of each employing organization; (*c*) number of years employed; (*d*) whether each position was held full-time or part-time; and (*e*) type of employing organization, that is, official health department (specifying State, county, or city), voluntary health agency, or other type. However, inasmuch as "number of years employed" rather than dates of employment was reported, it is sometimes impossible to check the precise sequence of periods of employment. Furthermore, upon preliminary examination of the schedules, it appeared that some physicians had failed to give employment history for the entire period of their availability for employment. Accordingly, each schedule was examined to determine the completeness with which employment experience had been reported.

In the examination, it was assumed that a physician had graduated from medical school and completed his interneship by the time he was 28 years old and, for the remaining years, was available for employment. The employment history was arbitrarily considered adequate if the discrepancy in length of employment reported was less than 5 years of "employable" time.

Schedules classified as reporting incomplete employment history were returned to the field for revision. However, approximately a fifth (22.5 percent) of the revised schedules were still lacking in the complete facts of employment history, if the criterion described above is valid. Further inspection of schedules with incomplete data indi-

cated that a large proportion of them had reported only public health employment. It is significant that, judging by the criteria described above, over a third of the city physicians returned schedules with inadequate information. In the other two types of jurisdictions the proportion was one out of five. Half the nonmedical health officers failed to report sufficient employment. Inasmuch as all but one of them are in city health departments, it follows that data on city employees are far less complete than those for the other jurisdictions.[10] Although it was impracticable to keep the incomplete schedules separate in the analysis, the lack of completeness in employment history must be kept constantly in mind in interpreting the material.

TYPES OF EXPERIENCE

Types of experience reported in fields other than public health are shown in table 8. Practically all experience reported by medical workers has been of a strictly medical character. It is also significant that, inasmuch as more than half of all health department physicians have had one or more years of private practice before entering public health, the majority of public health physicians in official agencies have had the opportunity to learn the point of view of the private practitioner. Approximately one out of seven reports having been a resident physician, but the manner in which residencies and interneships were reported makes it difficult to determine in any given instance which is the correct interpretation. A few of the medical personnel have had business experience; 19 have previously been educators, and 10 have had laboratory experience.

TABLE 8.—*Types of experience reported by medical personnel in health departments*

Type of experience	All physicians		Medical health officers		Administrative physicians		Staff physicians	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,956	100.0	947	100.0	579	100 0	430	100.0
Public health only	410	21 0	193	20.4	110	19 0	107	24.9
Other than public health [1]	1,546	79 0	754	79 6	469	81.0	323	75.1
Private practice	1,030	52.7	562	59.3	300	51.8	168	39.1
City, county, or clinic physician	125	6.4	46	4.9	47	8.1	32	7.4
Instructor in medical school	49	2 5	14	1.5	24	4.1	11	2.6
Resident	290	14.8	93	9.8	122	21.1	75	17.4
All other	313	16.0	144	15.2	82	14.2	87	20.2

[1] Combinations are not shown, but numbers and percentages are shown for each type of experience reported.

The employment history of nonmedical health officers is so widely varied that it cannot conveniently be incorporated into the table; for example, 7 reported managerial experience, 4 have been office workers,

[10] A part of the failure to report complete employment may be due to failure to report periods of unemployment. The present analysis makes no provision for this possibility.

and 3 have had experience in education. Furthermore, it should be recalled that half of the group obviously did not report complete employment history.

LENGTH OF MEDICAL PRACTICE

Since medical practice, either in an institution or as a private physician, was the experience most often reported, the length of such experience for the several categories of physicians is shown in table 9. The wide variability in the amount of experience in medical practice is the outstanding feature of the table. A few physicians have had as many as 40 years of such experience and the average for the entire group reporting medical practice is over 10 years. One-third of the group either failed to report any medical practice or had had no such experience. These physicians probably chose public health as a career and began work in it immediately after their interneship. On the other hand, some with very long experience in the practice of medicine are believed to have continued part-time practice while serving as whole-time public health workers. In the absence of dates of employment on the schedules and with no adequate criteria to guide in deciding such cases, distributions given in the table are based on reports as submitted. Health officers average 12 years of medical experience, but the other groups average 3 years less. Relatively fewer of the staff physicians than of the other groups report private practice.

TABLE 9.—*Length of experience in medical practice, exclusive of public health work, among public health physicians*

Years of private practice [1]	All physicians	Medical health officers	Administrative physicians	Staff physicians
	Number			
Total persons	1,956	947	579	430
Total reporting private practice	1,236	620	380	236
0–4	540	228	201	111
5–9	205	103	61	41
10–14	163	81	44	38
15–19	101	61	22	18
20–24	82	49	23	10
25–29	75	47	18	10
30–34	39	28	6	5
35–39	22	15	5	2
40 or more	9	8		1
Average, years	10.6	12.3	8.7	9.1
None reported	720	327	199	194
	Percentage			
Total persons	100.0	100.0	100.0	100.0
Total reporting private practice	63.2	65.5	65.6	54.9
0–4	27.6	24.1	34.7	25.8
5–9	10.5	10.9	10.5	9.5
10–14	8.3	8.5	7.6	8.9
15–19	5.2	6.4	3.8	4.2
20–24	4.2	5.2	4.0	2.3
25–29	3.8	5.0	3.1	2.3
30–34	2.0	3.0	1.0	1.2
35–39	1.1	1.6	0.9	0.5
40 or more	0.5	0.8		0.2
None reported	36.8	34.5	34.4	45.1

[1] Includes residencies, if definitely identifiable as such.

PUBLIC HEALTH EXPERIENCE

It has previously been pointed out that a number of physicians in health departments reported only their present positions and an additional number reported only positions in public health. Judging largely from the results of the attempt made to secure more complete data, it is safe to say that public health experience was more completely reported than any other type of prior employment. Since every person returning a schedule was employed by a public health department, all will, by definition, report some public health experience. The length of that experience is shown in table 10. This table has been arranged to show the distinctly jurisdictional character of differences in length of employment. Approximately half the physicians have had less than 5 years of public health experience and the city health department employees have been in the field longer than those in other jurisdictions. The low average for State and county employees is accounted for in some measure by the recent increase in employment in those jurisdictions. Here again, we see the effect of the Social Security Act on public health.

The White House Conference survey also obtained data on the public health experience of the 691 physicians studied. As of 1930, physicians in public health reported an average experience of 8.7 [11] years in public health work as compared to the present average of 8.2 years. Mountin and Pennell in their study of Tenure of Office for Health Officers [12] report the median years of experience as 3.4. However, their data are not directly comparable with the present study, inasmuch as they included not only currently employed health officers but also those whose tenure had terminated.

TABLE 10.—*Number of years of public health experience [1] reported by health officers and other medical personnel*

Years of experience in public health	All physicians		State employees		County employees		City employees		Nonmedical health officers	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,956	100.0	487	100.0	951	100.0	518	100.0	89	100.0
0–4	954	48.8	268	55.0	507	53.3	179	34.6	15	16.9
5–9	367	18.8	89	18 3	170	17 9	108	20.9	18	20 2
10–14	296	15.1	55	11 3	159	16.7	82	15.8	21	23.6
15–19	172	8.8	36	7.4	71	7.5	65	12 5	8	9.0
20–24	93	4.7	22	4.5	27	2.8	44	8.5	13	14 6
25–29	43	2.2	9	1.9	12	1.3	22	4.2	8	9.0
30 or more	31	1.6	8	1.6	5	.5	18	3.5	6	6.7
Average	8.2		7.5		7.2		10.8		14.4	

[1] Including present position.

[11] This takes into account only 651 out of the 691 whose experience was reported. Forty did not report number of years.

[12] Tenure of Office for Health Officers, by Joseph W. Mountin and Elliott Pennell. Am. J. Pub. Health, 28: 1311–1318 (November 1938).

VARIETY OF EXPERIENCE

In considering the qualifications of a health department employee in terms of his previous experience, one must take into account not only the length of his experience in the field, but also the extent to which he has had a variety of employment that would give him a better understanding of the scope of public health. Of course, in some instances shifting from place to place, or from one agency to another, may indicate that the employee has been unsatisfactory. On the other hand, employment in several localities or in different agencies will, through acquainting him with a variety of problems and administrative practices, broaden his vision and stimulate professional development.

From the reported material, it was possible to obtain two indexes of the variety of experience which the medical personnel in public health have had, i. e., number of public health positions held and experience in other States. In addition to those reporting only the present position, 410 health officers (43 percent of the total), 215 administrative physicians (37 percent), and 240 staff physicians (56 percent) reported their present work in public health as their only public health positions. In all, then, a total of 1,051 physicians (nearly 54 percent of the total) and 60 of the 89 nonmedical health officers have only whatever public health experience they have gained in one jurisdiction. The complete distribution of the number of public health positions held appears in table 11. It is interesting to note that a larger percentage of administrative physicians than of either of the other groups have had more than one position in public health. This may indicate a tendency for health officers to select experienced administrative co-workers even though they themselves may not have had a variety of experience.

TABLE 11.—*Number of positions in public health reported by health officers and other medical personnel*

Number of public health positions reported	All physicians		Medical health officers		Administrative physicians		Staff physicians		Nonmedical health officers	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,956	100.0	947	100 0	579	100.0	430	100 0	89	100.0
1[1]	1,051	53.7	490	51.8	246	42.5	315	73.3	60	67.4
2	416	21 3	218	23.0	131	22 6	67	15.6	15	16 9
3	222	11 4	107	11.3	86	14 8	29	6.7	10	11.3
4	129	6.6	60	6.3	58	10.0	11	2.6	2	2 2
5	71	3.6	33	3.5	34	5.9	4	.9		
6	32	1 6	17	1.8	11	1.9	4	.9	1	1.1
7	23	1.2	15	1.6	8	1.4			1	1.1
8 or more	12	.6	7	.7	5	.9				

[1] Includes those reporting only present employment.

It might be pointed out that only four of the nonmedical health officers have had more than three positions in public health. Apparently, in addition to being untrained basically, the great majority of nonmedical health officers have had little or no experience aside from their present positions.

Although fewer than half of the medical personnel have had more than one position in public health, the number who have had experience in other States is much smaller. One physician out of five has worked in more than one State but only one in twenty has worked in as many as three States. Only two of the nonmedical health officers have worked in any State other than the one in which they are now employed.

In view of the limited training of medical workers in public health, their restricted experience would seem to be a handicap to a broad understanding of the public health problem and the ways of meeting it.

STABILITY OF PUBLIC HEALTH EMPLOYMENT

Stability of employment in any profession, and particularly in a field like public health, is an important consideration, not only for the employee but also from the point of view of the public and efficiency of service. Employees do not wish to spend time, money, and effort in training for a specialized type of work if the chance of remaining in it, i. e., job security, is extremely small. This does not mean that one should expect to hold a given position indefinitely; but, rather, that the field should offer opportunities and chance for advancement. From the point of view of efficiency a rapidly changing personnel is undesirable since it renders poor service. The primary reason for this is that in a profession such as public health, it takes time to establish a program and set it into effective operation. A change in personnel usually means a corresponding change in procedures and readjustment of routine practices with interruption to, or diminution of, service. Furthermore, if the employing organization, in this case the health department, is known to have a high rate of personnel turn-over, it finds itself unable to secure good employees who, if they are trained and experienced, expect stability.

The schedules in this survey do not provide complete data on stability since they cover the experience of workers now in health departments but do not, as has previously been pointed out, contain any information on those who have left the field.[13] Nevertheless, two indexes of stability of employment are available in the data. First of all, there are the reports on length of employment in the present position. The average for all physicians is 6.4 years. City health department physicians have been in their present positions longer

[13] It is recognized that a relatively limited number of physicians in public health are affiliated with nonofficial agencies, and that some health department physicians who leave official agencies remain in public health work.

than any other group. The average for physicians employed by city departments is 9.3 years, although two-fifths of them have been employed less than 5 years. Staff physicians, the majority of whom are in the cities, have likewise had longer employment in their present positions (7.8 years) than either State or county workers (5.4 and 5.3 years, respectively). Admittedly, the interpretation of these figures must be conditioned by the fact that expansion in public health departments during the past 5 years has been taking place chiefly in State and county units rather than in cities, thus decreasing the average in these two types of jurisdictions. This measure of stability is not entirely adequate in that the employment is continuing and there is no way of estimating its probable future.

A more important measure of stability from the point of view of the individual considering public health as a prospective profession is the possibility of his remaining continuously in the field after entering it, even though he may not stay in any one position for an extended period of time.

Tabulation of the number of periods of full-time employment outside the field of public health but subsequent to the first public health employment reported (see table 12) gives the measure of stability referred to.[14] Out of every six physicians now in official

TABLE 12.—*Periods of full-time employment not in public health after first public health employment reported by health officers and other medical personnel*

Periods of full-time employment not in public health after entering the field	All physicians		Medical health officers		Administrative physicians		Staff physicians		Nonmedical health officers	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total individuals	1,956	100 0	947	100.0	579	100.0	430	100.0	89	100.0
None, present position only reported	186	9 5	80	8.4	31	5.4	75	17.4	19	21.3
All employment in public health	1,504	76 9	737	77.9	460	79.5	307	71.4	66	74.2
1	149	7.6	73	7.7	54	9.3	22	5.1	4	4.5
2	64	3.3	36	3.8	10	1.7	18	4.2		
3	34	1.7	15	1.6	15	2.6	4	.9		
4	13	.7	4	.4	7	1.2	2	.5		
5 or more	6	.3	2	.2	2	.3	2	.5		
Percentage of employment (years) not in public health		48.7		52.4		46.7		41.3		43.1

health departments, five have remained continuously in public health work since their first employment in it. The proportion of physicians who report having any other kind of work after they had their first public health position is only 14 percent of the total and is only 15

[14] It has been pointed out that the schedule did not permit exact determination of the continuity of employment, particularly if periods of unemployment (which were usually not reported) intervened. However, following the reasonable assumption that the reporting of employment was according to instructions and followed the order of employment, the above determinations are valid.

percent even among administrative physicians who have had the most varied experience. It appears quite clearly, therefore, that the majority of physicians now in health departments have enjoyed occupational stability in the field of public health. This coincides with the findings of Mountin and Pennell's study previously cited that physicians beginning public health work either continue in the field without interruption or leave within a very short time.

SUMMARY AND DISCUSSION

An analysis of the training and experience of health officers and other medical personnel from questionnaires submitted by the workers leads to the following conclusions:

1. Public health departments have employed and retained a large proportion of workers who came into the field of public health without previous experience or specialized training for it.

2. Basic academic training of the majority of the physicians in public health is up to the standard currently recommended by the profession and that of the administrative physicians is better than that of health officers or staff physicians. County and State employees have more training than those in cities.

3. Perhaps because of recent rapid expansion in public health, and a scarcity of adequately trained candidates for the new positions, there has developed a tendency to employ young physicians and train them after they begin work. If the general level of training among employees in health departments is to be raised, either of two courses of action can be taken: (*a*) Institute a more intensive graduate public health training program so that a sufficient number of candidates for employment will be available; or (*b*) continue the present system of in-service training.

4. Physicians now in health departments have had little variety of experience either in other localities than the one in which they are now working or in other official or nonofficial agencies. If it is desired to have, especially in the larger State departments, a mobile corps of men adaptable to all situations, this fact may indicate the need for a change of administrative or employment policy.

5. The problem of employee replacement, especially in cities, will be a serious one in the next 10 years, due largely to the death or retirement of older physicians now in service. Although city workers now have less public health training than those in other jurisdictions, future employment may raise the level of public health training in city jurisdictions.

DISABLING MORBIDITY AMONG INDUSTRIAL WORKERS, THIRD QUARTER OF 1940, WITH OBSERVATIONS ON INFLUENZA, BRONCHITIS, AND PNEUMONIA, 1931–40 [1]

By William M. Gafafer, *Senior Statistician, United States Public Health Service*

The data on the frequency of sickness and nonindustrial injuries causing disability for 8 consecutive calendar days or longer during the third quarter and the first 9 months of 1939 and 1940, presented in table 1, are derived from analyses of periodic reports from industrial sick benefit organizations comprising mutual sick benefit associations, group insurance plans, and company relief departments. More than 170,000 male workers are represented, employed in plants located in Pennsylvania, Illinois, Massachusetts, Connecticut, New York, Ohio, Maine, South Dakota, New Jersey, and Canada.

Table 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause, the third quarter of 1940 compared with the third quarter of 1939, and the first 9 months of 1940 compared with the first 9 months of the years 1935–39, inclusive*

Cause (numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of cases per 1,000 males				
	Third quarter		First 9 months		
	1940	1939	1940	1939	1935–39
Sickness and nonindustrial injuries [1]	77.2	70.8	100.3	92.8	92.2
Nonindustrial injuries (163–198)	11.8	11.2	11.7	10.2	11.1
Sickness [1]	65.4	59.6	88.6	82.6	81.1
Respiratory diseases	20.7	14.7	40.7	36.4	34.3
Influenza and grippe (33)	6.3	4.0	19.2	18.7	16.5
Bronchitis, acute and chronic (106)	3.8	2.3	5.0	4.0	4.3
Diseases of the pharynx and tonsils (part of 115)	3.6	3.3	5.2	4.7	5.0
Pneumonia, all forms (107–109)	1.7	1.1	3.9	3.0	2.6
Tuberculosis of the respiratory system (13)	.7	.6	.7	.8	.9
Other respiratory diseases (104, 105, 110–114)	4.6	3.4	6.1	5.2	5.0
Nonrespiratory diseases	42.0	42.9	45.7	44.1	44.2
Digestive diseases	13.9	14.6	14.7	14.1	13.8
Diseases of the stomach except cancer (117, 118)	3.8	3.3	3.9	3.6	3.8
Diarrhea and enteritis (120)	1.4	1.5	1.4	1.3	1.3
Appendicitis (121)	4.9	5.0	5.2	4.5	4.3
Hernia (part of 122)	1.3	1.7	1.5	1.6	1.6
Other digestive diseases (part of 115 and 122, 116, 123–129)	2.5	3.1	2.7	3.1	2.8
Nondigestive diseases	28.1	28.3	31.0	30.0	30.4
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	3.7	3.7	4.4	4.4	4.1
Other genitourinary diseases (133–138)	2.5	2.6	2.6	2.4	2.4
Neuralgia, neuritis, sciatica (part of 87)	1.8	2.1	2.5	2.2	2.2
Neurasthenia and the like (part of 84)	1.1	.8	1.1	.9	1.1
Other diseases of the nervous system (80–83, 85, 86, part of 84 and 87)	.7	1.2	1.0	1.1	1.1
Rheumatism, acute and chronic (58, 59)	3.6	2.6	4.2	3.6	4.1
Diseases of the organs of locomotion, except diseases of the joints (part of 156)	2.5	2.4	2.9	2.6	2.8
Diseases of the skin (151–153)	3.2	3.4	2.9	2.8	3.0
Infectious and parasitic diseases [2] (1–12, 14–24, 26–29, 31, 32, 34–44)	1.9	1.8	2.0	2.4	2.6
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, part of 156, 157, 162)	7.1	7.7	7.4	7.6	7.0
Ill-defined and unknown causes (200)	2.7	2.0	2.2	2.1	2.6
Average number of males covered in the record	202,209	176,671	195,628	172,821	163,649
Number of organizations	25	26	25	26	

[1] Exclusive of disability from the venereal diseases and a few numerically unimportant causes of disability.
[2] Except influenza, respiratory tuberculosis, and the venereal diseases.

[1] From the Division of Industrial Hygiene, National Institute of Health. The report for the second quarter appeared in Public Health Reports, vol. 55, pp. 2127–2130, November 15, 1940.

Interest in table 1 centers chiefly on the increase in the number of workers exposed, and on the increases during the third quarter in rates for certain causes of the respiratory group of diseases. These causes, bronchitis (acute and chronic), influenza and grippe, and pneumonia (all forms), show increases of 65 percent, 57 percent, and 55 percent, respectively.

TABLE 2.—*Frequency of disabling cases of influenza and grippe, bronchitis, and pneumonia lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, the third quarters of 1931–40, inclusive*

Year in third quarter of which onset of disability occurred	Rate or average annual number of cases per 1,000 employees			Ratio of rate to rate for 1931–40		
	Influenza and grippe	Bronchitis, acute and chronic	Pneumonia, all forms	Influenza and grippe	Bronchitis, acute and chronic	Pneumonia, all forms
1931–40 (mean)	4.6	2.7	1.1	1.00	1.00	1.00
1931	4.4	2.6	.7	.96	.96	.64
1932	4.9	2.3	.9	1.07	.85	.82
1933	4.3	2.3	.8	.93	.85	.73
1934	4.2	2.1	.9	.91	.78	.82
1935	4.1	2.8	1.1	.89	1.04	1.00
1936	4.4	2.7	.9	.96	1.00	.82
1937	5.2	3.1	1.6	1.13	1.15	1.45
1938	4.4	2.6	1.3	.96	.96	1.18
1939	4.0	2.3	1.1	.87	.81	1.00
1940	6.3	3.8	1.7	1.37	1.41	1.55

Influenza, bronchitis, and pneumonia, 1931–40.—An examination of the third quarter frequency rates and ratios yielded by influenza, bronchitis, and pneumonia for the past 10 years, 1931–40, shown in table 2, discloses a number of noteworthy relationships: (1) For any particular year the third quarter rates, when set down in decreasing order of magnitude, show influenza ranking first, bronchitis, second, and pneumonia, third; (2) for each cause the third quarter rate for 1940 is the highest, and is most closely approached by the third quarter rate for 1937; (3) when the third quarter rate for 1940 for each of the 3 causes is related to the corresponding average rate yielded by all 10 third quarters, it is found that the percentage excesses for pneumonia, bronchitis, and influenza are 55 percent, 41 percent, and 37 percent, respectively; (4) the greatest variability about the average derived from the 10 third quarter rates is shown by pneumonia, while the corresponding variabilities for influenza and bronchitis are less and similar to each other; and (5) the trend of the 10 third quarter rates for each of the 3 causes appears to be increasing, pneumonia showing the most rapid rate of increase and influenza, the least. Thus, the third quarter of 1940 yielded abnormally high frequencies for influenza, bronchitis, and pneumonia; in fact, these third quarter frequencies are the highest that have been experienced for these causes since 1931. It is at present too early to state with any degree of assurance that the phenomenon is principally related to the increase in the number of workers exposed.

COURT DECISION ON PUBLIC HEALTH

Filled-milk law construed.—(Missouri Supreme Court; *State ex rel. McKittrick, Atty. Gen.*, v. *Carolene Products Co.*, 144 S.W.2d 153; decided September 3, 1940.) Section 12408 of the Missouri Statutes Annotated, among other things, prohibited the sale of milk, skim milk, etc., to which had been added any fat or oil other than milk fat. Section 12413 was similar to section 12408 except that the former did not name emulsified cream, which was not involved in the instant case. Section 12409 defined "filled milk" to mean "any milk, cream, or skim milk * * * to which has been added, or which has been blended or compounded with, any fat or oil other than milk fat, so that the resulting product is in imitation or semblance of milk, cream, or skim milk * * * which has been melted or refined by heating, boiling, or mixing." Distinctive proprietary food compounds meeting certain conditions were excepted from such definition. Section 12413 was a part of one law, while sections 12408 and 12409 were a part of another law which was enacted at the same session as and approved three days later than the first law.

In construing these statutory provisions the Supreme Court of Missouri said that sections 12408 and 12413 were general statutes dealing with milk to which had been added fat or oil other than milk fat and that section 12409 dealt with the same subject in a more minute and definite way. The latter, it was said, being special would prevail over the two former sections. The court then concluded that, considering the statutes dealing with the subject as a whole, the intent of the legislature was to prohibit the sale of filled milk, that filled milk was only that milk to which had been added fat or oil other than milk fat "so that the resulting product is in imitation or semblance of milk, cream, or skim milk," and that if the product did not come within the statutory definition of filled milk it could be lawfully sold in the State.

DEATHS DURING WEEK ENDED DECEMBER 14, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 14, 1940	Corresponding week, 1939
Data from 88 large cities of the United States:		
Total deaths	8,648	8,432
Average for 3 prior years	8,641	
Total deaths, 50 weeks of year	418,616	412,011
Deaths under 1 year of age	567	464
Average for 3 prior years	509	
Deaths under 1 year of age, 50 weeks of year	25,229	24,788
Data from industrial insurance companies:		
Policies in force	64,791,753	66,440,030
Number of death claims	11,293	12,215
Death claims per 1,000 policies in force, annual rate	9.1	9.6
Death claims per 1,000 policies, 50 weeks of year, annual rate	9.6	9.8

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 21, 1940

Summary

Official reports from the State health officers show 48,528 cases of influenza for the week ended December 21, as compared with 29,864 for the preceding week. The current report showed the highest weekly incidence of influenza since the 1932–33 epidemic when a peak of 90,000 cases was reached during the week ended December 31, 1932. The next highest preceding peak week was on January 5, 1929, when 196,000 cases were reported.

The principal increases for the current week were noted in Louisiana (from 321 to 8,000), Washington (from 914 to 3,796), Oregon (from 978 to 2,645), Nevada (from 430 to 1,000), Wyoming (from 4 to 1,085), Arkansas (from 234 to 2,191), Indiana (from 213 to 979), and Texas (from 671 to 7,307), while slight decreases were indicated in California, Utah, Arizona, and Idaho.

The reports state generally that the disease is of a mild type with no appreciable increase in pneumonia cases or mortality as a result of the outbreak.

In regard to the other common communicable diseases, conditions were generally favorable throughout the country with decreases indicated in the incidence of diphtheria, meningitis, poliomyelitis, scarlet fever, smallpox, typhoid fever, and whooping cough.

For the current week the Bureau of the Census reports 8,697 deaths in 88 major cities of the United States as compared with 8,648 for the preceding week and with a 3-year (1937–39) average of 8,583 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended December 21, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Dec. 21, 1940	Dec. 23, 1939		Dec. 21, 1940	Dec. 23, 1939		Dec. 21, 1940	Dec. 23, 1939		Dec. 21, 1940	Dec. 23, 1939	
NEW ENG.												
Maine	0	4	4	3	------	1	37	46	46	1	0	0
New Hampshire	0	0	0	2	------	------	4	2	9	0	0	0
Vermont	0	0	0	------	------	------	37	25	25	0	0	0
Massachusetts	1	5	5	------	------	------	294	178	195	3	0	1
Rhode Island	0	0	0	1	------	------	0	51	51	0	0	0
Connecticut	0	0	6	2	3	3	6	97	76	0	0	0
MID ATL.												
New York	20	26	26	[1] 41	[1] 15	[1] 14	1,194	395	395	4	1	5
New Jersey	8	9	9	4	8	8	336	13	20	0	0	0
Pennsylvania	17	44	55	------	------	------	1,121	66	67	1	9	6
E. NO. CEN.												
Ohio	5	17	18	12	8	8	42	8	22	2	1	3
Indiana	8	22	22	979	14	25	33	1	8	0	0	1
Illinois	17	39	39	23	14	25	669	21	21	0	0	4
Michigan [2]	7	5	11	2	5	1	780	206	206	1	0	1
Wisconsin	0	0	1	42	24	55	330	83	83	0	0	0
W. NO. CEN.												
Minnesota	1	0	3	1	3	------	29	31	31	0	0	0
Iowa	3	10	10	8	3	5	133	60	9	0	0	0
Missouri	10	23	22	6	5	60	15	6	7	3	1	1
North Dakota	3	0	1	52	26	3	12	2	2	1	0	0
South Dakota	4	4	4	------	2	1	1	3	2	0	0	0
Nebraska	0	0	2	------	------	------	8	1	3	0	0	0
Kansas	3	5	6	269	283	4	70	120	10	1	2	2
SO. ATL.												
Delaware	2	0	0	------	------	------	25	5	5	0	0	0
Maryland [2]	0	11	11	4	8	12	1	1	41	0	0	3
Dist. of Col.	4	1	6	3	1	1	3	2	3	1	0	0
Virginia	10	15	30	203	33	------	41	4	46	2	0	3
West Virginia [2]	12	9	11	38	15	43	6	5	12	1	4	3
North Carolina [3]	28	48	39	10	44	12	31	145	145	2	0	1
South Carolina [3]	4	7	3	315	1,638	236	21	1	3	0	1	1
Georgia [3]	7	15	15	178	975	88	18	9	0	0	0	0
Florida	3	4	11	28	11	6	2	0	3	0	0	2
E. SO. CEN.												
Kentucky	3	9	12	184	4	31	195	1	32	1	0	3
Tennessee	11	14	14	52	99	50	29	43	14	0	3	3
Alabama [3]	11	9	18	222	398	150	61	8	8	2	0	1
Mississippi [2]	5	9	5	------	------	------	------	------	------	1	0	1
W. SO. CEN.												
Arkansas	5	16	7	2,191	79	52	28	0	3	0	0	0
Louisiana [3]	3	11	11	8,000	1	12	1	1	2	1	0	0
Oklahoma	15	5	19	1,869	119	80	0	2	9	0	1	3
Texas [3]	40	84	74	7,307	597	493	46	85	72	3	2	2
MOUNTAIN												
Montana	0	0	1	106	306	22	1	14	14	0	1	0
Idaho	0	0	0	51	------	2	3	2	13	0	1	0
Wyoming	0	1	1	1,085	1	------	1	12	2	0	0	0
Colorado	4	11	11	47	245	1	79	24	12	0	3	0
New Mexico	1	2	4	27	2	2	66	5	16	0	0	0
Arizona	2	6	4	1,006	75	76	38	3	2	0	0	0
Utah [2]	0	0	0	5,133	688	------	3	61	38	0	0	1
Nevada	------	------	------	1,000	------	------	------	------	------	------	------	------
PACIFIC												
Washington	0	1	2	3,796	------	------	182	418	146	2	0	1
Oregon	3	2	1	2,645	100	39	5	37	13	0	0	1
California	5	22	33	12,081	131	40	53	190	190	0	0	3
Total	285	525	543	48,528	5,997	1,634	6,090	2,502	2,845	33	30	81
51 weeks	15,417	23,589	28,211	270,265	182,255	155,735	269,665	372,517	372,517	1,582	1,931	5,307

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 21, 1940, and comparison with corresponding week of 1939 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Dec. 21, 1940	Dec. 23, 1939		Dec. 21, 1940	Dec. 23, 1939		Dec. 21, 1940	Dec. 23, 1939		Dec. 21, 1940	Dec. 23, 1939	
NEW ENG.												
Maine	0	1	0	19	16	16	0	0	0	1	1	1
New Hampshire	0	0	0	6	0	7	0	0	0	0	0	0
Vermont	0	0	0	11	7	7	0	0	0	0	0	0
Massachusetts	0	2	0	145	88	178	0	0	0	0	0	1
Rhode Island	0	0	0	2	3	28	0	0	0	0	0	0
Connecticut	0	0	0	33	61	57	0	0	0	2	1	1
MID. ATL.												
New York	1	1	1	284	353	353	0	0	0	19	8	5
New Jersey	0	2	0	137	113	103	0	0	0	0	2	1
Pennsylvania	1	2	1	218	276	387	0	0	0	7	9	9
E. NO. CEN.												
Ohio	2	1	1	167	231	201	1	1	2	3	3	3
Indiana	2	0	0	84	108	133	1	5	6	1	0	3
Illinois	3	1	1	334	323	423	6	0	2	4	1	5
Michigan [3]	5	2	1	182	294	344	5	0	1	1	2	2
Wisconsin	10	3	0	127	130	188	6	1	6	0	3	1
W. NO. CEN.												
Minnesota	2	1	1	78	119	119	17	19	15	1	0	1
Iowa	2	4	0	70	72	132	2	5	15	1	0	1
Missouri	0	0	0	79	128	128	2	1	4	6	4	4
North Dakota	0	0	0	12	22	22	1	0	3	0	0	0
South Dakota	1	1	1	17	4	18	2	5	5	0	1	0
Nebraska	2	2	0	27	16	27	1	3	1	0	0	0
Kansas	0	0	1	82	104	125	0	0	7	0	0	1
SO. ATL.												
Delaware	1	0	0	18	24	19	0	0	0	0	0	0
Maryland [2]	1	1	0	39	46	49	0	0	0	0	3	3
Dist. of Col.	0	0	0	7	10	10	0	0	0	1	1	1
Virginia	3	1	1	17	31	35	0	0	0	3	2	4
West Virginia [2]	3	6	1	41	73	73	0	0	0	2	0	2
North Carolina [3]	0	1	0	87	68	53	0	0	0	2	1	1
South Carolina [3]	0	0	0	10	11	6	0	0	0	0	1	1
Georgia [3]	0	0	0	16	44	21	0	0	0	6	6	6
Florida	0	0	0	1	8	8	0	0	0	0	0	0
E. SO. CEN.												
Kentucky	0	2	0	59	54	60	0	0	0	2	2	2
Tennessee	0	0	1	58	93	41	0	1	0	2	2	2
Alabama [3]	1	0	1	25	21	21	0	2	1	1	0	3
Mississippi [2]	0	0	0	9	6	8	0	0	0	0	0	1
W. SO. CEN.												
Arkansas	0	2	0	5	19	13	0	4	0	3	3	2
Louisiana [3]	3	0	1	20	11	12	0	0	0	16	3	6
Oklahoma	0	4	2	24	23	36	2	5	1	0	0	2
Texas [3]	2	4	1	69	84	84	1	5	4	6	22	16
MOUNTAIN												
Montana	0	0	0	30	30	30	0	1	21	0	0	0
Idaho	0	0	0	9	5	21	0	0	0	1	0	1
Wyoming	0	0	0	11	16	12	0	0	3	0	1	0
Colorado	0	2	0	17	50	50	1	46	7	0	0	1
New Mexico	0	1	0	7	27	27	0	0	0	5	3	3
Arizona	0	2	0	1	4	9	0	0	0	1	0	0
Utah [2]	1	1	0	6	15	23	0	2	0	0	0	0
Nevada	------	------	------	------	------	------	------	------	------	------	------	------
PACIFIC												
Washington	1	0	0	38	54	49	0	0	1	0	0	1
Oregon	1	0	0	7	20	43	0	0	6	0	1	2
California	1	8	6	68	142	190	0	4	8	5	3	6
Total	49	58	45	2,813	3,457	4,137	48	110	163	102	89	106
51 weeks	9,734	7,261	7,261	152,462	158,500	218,448	2,402	9,456	9,456	9,507	12,630	14,486

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended December 21, 1940, and comparison with corresponding week of 1939 and 5 year median—Con.

Division and State	Whooping cough, Week ended Dec. 21, 1940	Whooping cough, Week ended Dec. 23, 1939
NEW ENG.		
Maine	19	14
New Hampshire	7	7
Vermont	18	35
Massachusetts	274	74
Rhode Island	4	15
Connecticut	81	67
MID. ATL.		
New York	410	351
New Jersey	162	82
Pennsylvania	571	250
E. NO. CEN.		
Ohio	192	51
Indiana	10	22
Illinois	171	71
Michigan [2]	285	111
Wisconsin	128	137
W. NO. CEN.		
Minnesota	70	42
Iowa	22	12
Missouri	51	20
North Dakota	11	2
South Dakota	12	0
Nebraska	9	2
Kansas	64	13
SO. ATL.		
Delaware	39	4
Maryland [2]	66	49
Dist. of Col	13	7
Virginia	71	23
West Vriginia [2]	34	28
North Carolina [3]	239	36
South Carolina [3]	29	19
Georgia [3]	13	10
Florida	3	4
E. SO. CEN.		
Kentucky	51	24
Tennessee	58	32
Alabama [3]	47	1
Mississippi [2]	----------	----------
W. SO. CEN.		
Arkansas	34	4
Louisiana [3]	5	28
Oklahoma	13	0
Texas [3]	160	106
MOUNTAIN		
Montana	3	6
Idaho	18	0
Wyoming	0	5
Colorado	40	11
New Mexico	15	42
Arizona	1	10
Utah [2]	11	40
Nevada	----------	----------
PACIFIC		
Washington	36	4
Oregon	12	26
California	149	84
Total	3,731	1,981
51 weeks	167,962	170,367

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended December 21, 1940, 27 cases as follows: North Carolina, 1; South Carolina, 4; Georgia, 9; Alabama, 7, Louisiana, 1; Texas, 5.

WEEKLY REPORTS FROM CITIES

City reports for week ended December 7, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	184	174	48	818	603	1,177	13	339	27	1,046	--------
Current week [1]	71	2,423	26	1,897	306	823	9	289	32	1,445	--------
Maine:											
Portland	0	------	0	0	1	1	0	0	0	16	29
New Hampshire:											
Concord	0	------	0	0	2	0	0	0	0	0	11
Manchester	0	------	1	0	1	9	0	0	0	0	16
Nashua	0	------	0	0	0	1	0	0	0	0	7
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	3
Burlington	0	------	0	0	0	0	0	0	0	0	10
Rutland	0	------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	1	------	0	52	15	49	0	7	0	127	233
Fall River	2	------	0	1	0	6	0	1	0	7	20
Springfield	0	------	0	0	3	2	0	0	0	5	41
Worcester	0	------	0	95	5	8	0	4	0	0	52
Rhode Island:											
Pawtucket	0	------	0	0	2	0	0	0	0	0	11
Providence	0	3	1	5	2	0	0	0	0	5	51
Connecticut:											
Bridgeport	0	------	0	0	4	5	0	1	0	1	36
Hartford	0	------	0	0	1	4	0	0	0	5	45
New Haven	0	------	0	0	0	9	0	0	0	13	34
New York:											
Buffalo	0	------	0	20	13	13	0	7	0	48	159
New York	13	8	0	412	44	121	0	51	9	122	1,366
Rochester	0	2	0	1	3	1	0	1	0	18	54
Syracuse	0	------	0	0	5	4	0	0	0	3	50
New Jersey:											
Camden	0	------	0	64	1	3	0	0	0	3	24
Newark	0	1	0	26	2	24	0	5	0	25	97
Trenton	0	1	0	0	3	14	0	0	0	4	45
Pennsylvania:											
Philadelphia	1	2	0	370	23	45	0	33	1	146	522
Pittsburgh	8	2	1	9	11	12	0	5	1	43	163
Reading	0	------	0	5	1	1	0	0	0	13	21
Scranton	0	------	--------	1	-------	0	0	-------	0	1	--------
Ohio:											
Cincinnati	1	------	0	1	8	11	0	8	0	2	131
Cleveland	0	23	8	11	11	23	0	8	0	66	189
Columbus	0	------	0	1	4	5	0	2	0	13	77
Toledo	0	------	0	2	2	8	0	1	0	15	64
Indiana:											
Anderson	0	------	0	0	2	2	0	0	0	0	6
Fort Wayne	0	------	0	0	3	0	0	0	0	0	29
Indianapolis	6	------	0	1	10	20	0	3	0	4	108
Muncie	0	------	0	0	0	3	0	0	0	1	17
South Bend	0	------	0	0	1	0	0	0	0	0	15
Terre Haute	1	------	0	0	1	0	0	1	1	0	11
Illinois:											
Alton	0	------	0	0	1	0	0	0	0	0	11
Chicago	6	4	1	394	22	119	0	38	1	66	729
Elgin	0	------	0	0	0	0	0	0	0	0	13
Moline	0	------	0	1	0	0	0	0	0	0	7
Springfield	0	------	1	0	4	13	0	0	0	5	30
Michigan:											
Detroit	1	2	0	317	16	70	0	8	2	124	245
Flint	0	------	0	2	5	2	0	1	0	13	30
Grand Rapids	0	------	1	8	3	3	0	0	0	31	41
Wisconsin:											
Kenosha	0	------	0	0	0	1	0	0	0	1	5
Madison	0	------	0	0	0	2	0	0	0	6	28
Milwaukee	0	------	0	30	0	28	0	3	0	34	82
Racine	0	------	0	4	0	2	0	0	0	0	11
Superior	0	------	0	0	0	3	0	0	0	6	7

[1] Figures for Boise estimated; report not received.

City reports for week ended December 7, 1940—Continued

State and city	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
Minnesota:											
Duluth	0	------	0	0	0	2	9	0	0	5	19
Minneapolis	0	------	0	0	5	19	0	0	0	35	102
St. Paul	0	------	0	2	5	5	0	0	0	28	72
Iowa:											
Cedar Rapids	0	------	--------	1	-------	7	0	-------	0	0	--------
Davenport	0	------	--------	0	-------	3	0	-------	0	0	--------
Des Moines	1	------	0	1	0	20	0	0	1	0	37
Sioux City	0	------	--------	0	-------	3	0	-------	0	0	--------
Missouri:											
Kansas City	0	------	0	3	6	12	0	2	0	55	92
St. Joseph	0	------	0	0	1	1	0	1	0	0	29
St. Louis	7	1	0	4	7	23	0	5	0	27	238
North Dakota:											
Fargo	0	------	0	0	0	0	0	0	0	2	13
Grand Forks	0	------	--------	0	-------	0	0	-------	0	0	--------
Minot	0	------	0	0	0	0	0	0	0	0	8
South Dakota:											
Aberdeen	0	------	--------	0	-------	1	0	-------	0	2	--------
Sioux Falls	0	------	0	0	0	1	0	0	0	0	10
Nebraska:											
Lincoln	0	------	--------	0	-------	8	0	-------	0	2	--------
Omaha	0	------	0	0	4	6	0	4	0	2	64
Kansas:											
Lawrence	0	------	0	0	0	0	0	0	0	0	7
Topeka	0	------	0	0	3	3	0	0	0	1	21
Wichita	1	------	0	3	7	5	0	0	0	39	33
Delaware:											
Wilmington	0	------	0	3	0	4	0	0	0	10	25
Maryland:											
Baltimore	1	5	1	0	14	19	0	13	0	64	219
Cumberland	0	------	0	0	1	1	0	0	1	0	12
Frederick	0	------	0	0	0	0	0	0	0	0	4
Dist. of Columbia:											
Washington	3	------	0	0	6	15	0	11	0	14	148
Virginia:											
Lynchburg	0	------	0	0	3	0	0	0	0	0	15
Norfolk	0	11	0	7	4	4	0	1	0	1	14
Richmond	1	------	0	0	2	7	0	0	1	0	39
Roanoke	1	------	0	0	0	1	0	1	0	12	14
West Virginia:											
Charleston	0	------	0	0	0	0	0	1	1	0	20
Huntington	0	------	--------	0	-------	1	0	-------	0	0	--------
Wheeling	0	------	--------	8	-------	0	0	-------	0	12	--------
North Carolina:											
Gastonia	0	------	--------	0	-------	0	0	-------	0	1	--------
Raleigh	0	------	0	0	1	0	0	0	0	5	10
Wilmington	2	------	0	0	1	3	0	0	0	1	9
Winston-Salem	0	------	0	0	1	1	0	1	0	29	15
South Carolina:											
Charleston	0	15	0	7	2	1	0	0	0	0	25
Florence	0	45	0	0	1	0	0	0	0	3	20
Greenville	1	------	0	1	0	3	0	0	1	8	2
Georgia:											
Atlanta	0	12	0	2	0	4	0	7	4	3	82
Brunswick	0	------	0	0	0	2	0	0	0	0	4
Savannah	1	20	0	0	1	2	0	4	0	1	32
Florida:											
Miami	0	4	0	1	0	0	0	1	1	0	38
Tampa	0	------	0	0	0	0	0	2	0	0	17
Kentucky:											
Ashland	0	1	0	2	0	1	0	1	1	7	8
Covington	0	------	0	3	0	0	0	3	0	2	16
Lexington	0	------	0	49	3	0	0	2	0	8	20
Louisville	0	------	0	1	6	13	0	3	0	8	86
Tennessee:											
Knoxville	0	------	0	1	3	3	0	0	0	6	32
Memphis	1	------	0	4	1	2	0	2	1	0	76
Nashville	0	------	2	8	2	5	0	1	0	7	48
Alabama:											
Birmingham	0	4	1	8	3	9	0	4	0	0	52
Mobile	0	1	1	0	2	1	0	2	0	0	21
Montgomery	0	------	--------	1	-------	1	0	-------	0	0	--------
Arkansas:											
Fort Smith	0	------	--------	0	-------	1	0	0	0	10	--------
Little Rock	0	5	0	0	3	1	0	0	0	0	26

City reports for week ended December 7, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Louisiana:											
Lake Charles	1	------	0	0	3	0	0	0	0	2	9
New Orleans	2	21	0	1	13	1	0	4	4	1	145
Shreveport	0	------	0	0	1	0	0	5	0	1	47
Oklahoma:											
Oklahoma City	1	20	1	0	6	5	0	1	0	0	58
Tulsa	5	------	0	0	5	2	0	1	0	15	36
Texas:											
Dallas	6	------	0	0	2	3	0	2	1	3	55
Fort Worth	0	------	0	2	3	10	0	1	0	13	38
Galveston	1	------	0	0	4	0	0	0	0	0	13
Houston	0	------	0	1	5	3	0	9	1	0	98
San Antonio	0	30	0	0	3	5	0	5	0	0	73
Montana:											
Billings	0	------	0	0	0	2	0	0	0	0	14
Great Falls	0	------	0	0	0	3	0	0	0	0	3
Helena	0	------	0	0	0	0	0	0	0	0	2
Missoula	0	------	0	0	0	1	0	1	1	0	10
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Colorado Springs	0	------	0	1	0	1	0	0	0	0	10
Denver	5	------	0	10	7	4	0	3	0	11	94
Pueblo	0	------	1	3	1	1	0	0	0	5	6
New Mexico:											
Albuquerque	0	------	0	0	1	0	0	2	0	2	12
Utah:											
Salt Lake City	0	------	2	0	8	3	0	1	0	2	43
Washington:											
Seattle	0	------	1	2	4	2	0	1	1	9	99
Spokane	0	------	1	0	3	0	0	0	0	0	30
Tacoma	0	------	0	3	1	0	0	1	0	4	37
Oregon:											
Portland	0	32	0	1	4	3	0	0	0	0	81
Salem	0	8	------	0	------	0	0	------	0	2	------
California:											
Los Angeles	1	1,625	7	6	10	10	0	12	0	49	431
Sacramento	3	143	1	0	6	7	0	0	0	0	36
San Francisco	0	498	0	0	11	2	0	7	1	39	207

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				South Carolina:			
Buffalo	2	1	0	Florence	1	0	0
New York	3	1	1	Texas:			
New Jersey:				Houston	0	1	1
Newark	1	0	1	Utah:			
Ohio:				Salt Lake City	0	0	1
Cleveland	0	0	1	California:			
Indiana:				Los Angeles	0	0	1
Indianapolis	0	0	3				

Encephalitis, epidemic or lethargic.—Cases: Baltimore, 1; Sacramento, 1.
Pellagra.—Cases: Charleston, S. C., 2; Savannah, 2; Montgomery, 2.
Typhus fever.—Cases: Charleston, S. C., 1; Atlanta, 1; Savannah, 1; Nashville, 2; Mobile, 2; New Orleans, 4; Shreveport, 1; Dallas, 1; Houston, 2.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 23, 1940.—During the week ended November 23, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis			1	3	3			1		8
Chickenpox		21	4	170	456	86	93	148	54	1,032
Diphtheria		36	2	36	1	3	10	1		89
Influenza		46			12	1			164	223
Measles		103	4	23	246	73	109	46	72	676
Mumps				64	102	55	3	13	13	250
Pneumonia		4			24	6		2	15	51
Poliomyelitis				2						2
Scarlet fever		16	1	113	135	9	11	11	22	318
Trachoma							1		7	8
Tuberculosis	1	7	7	35	66	3	1	2		122
Typhoid and paratyphoid fever		1	4	12	3	1	3			24
Whooping cough		29	1	248	151	22	19	34	14	518

CUBA

Provinces—Notifiable diseases—4 weeks ended November 9, 1940.—During the 4 weeks ended November 9, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	3		1	4		6	14
Diphtheria	2	17		1	2	4	26
Hookworm disease	1	16					17
Leprosy				1			1
Malaria	41	22		15	3	57	138
Measles		3					3
Poliomyelitis	2						2
Scarlet fever		1					1
Tuberculosis	10	52	10	33	16	28	149
Typhoid fever	37	61	10	29	31	10	178

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—4 weeks ended October 5, 1940.—During the 4 weeks ended October 5, 1940, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	283	Poliomyelitis	91
Influenza	1,012	Scarlet fever	486
Paratyphoid fever	170	Typhoid fever	23

JAMAICA

Communicable diseases—4 weeks ended November 23, 1940.—During the 4 weeks ended November 23, 1940, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	2	8	Puerperal sepsis	1	3
Diphtheria	3	2	Scarlet fever	2	
Dysentery	16	13	Tuberculosis	23	82
Erysipelas		1	Typhoid fever	9	50
Leprosy	2				

YUGOSLAVIA

Communicable diseases—4 weeks ended October 6, 1940.—During the 4 weeks ended October 6, 1940, certain communicable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	66	5	Poliomyelitis	13	
Cerebrospinal meningitis	69	21	Scarlet fever	250	3
Diphtheria and croup	646	31	Sepsis	10	3
Dysentery	404	40	Tetanus	53	25
Erysipelas	189	8	Typhoid fever	434	32
Favus	6	2	Typhus fever	4	1
Lethargic encephalitis	1		Weil's disease	1	
Paratyphoid fever	31				

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-September 1940	October 1940	November 1940—week ended—				
				2	9	16	23	30
ASIA								
Ceylon	C				1			
China:								
Dairen	C	2						
Foochow	C	481	85					
Hong Kong	C	758	51	9	19	7	3	
Macao	C	365	143	8	12	5		
Manchuria	C	31						
Shanghai	C	465	98	1	4	2	1	
Shantung Province	C	244						
India	C	43,094						
Bassein	C	164						
Bombay	C	13						
Calcutta	C	1,892	116					
Cawnpore	C	329	4					
Chittagong	C	4						
Madras	C	1						
Moulmein	C	16						
Porto Novo	C	1						
Rangoon	C	43						
Vizagapatam	C	20	1					
India (French)	C	34						
Indochina (French)	C	436						
Thailand	C	235						

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE

[C indicates cases; D, deaths]

Place		January-September 1940	October 1940	November 1940—week ended— 2	9	16	23	30
AFRICA								
Algeria	C	20	2					
Plague-infected rats		2						
Belgian Congo	C	21	2					
British East Africa:								
Kenya	C	9						
Uganda	C	156						
Egypt	C	[1] 409						
Madagascar	C	472	17		16		21	25
Morocco.[2]								
Rhodesia, Northern	C	1						
Senegal:								
Dakar	D	[3] 1						
Thies	C	1						
Tivaouane	C	3						
Tunisia: Tunis	C	5	1		1	2	1	
Plague-infected rats		1						
Union of South Africa	C	25						
ASIA								
China.[4]								
Dutch East Indies:								
Java and Madura	C	294						
West Java	C	8						
India	C	14,438						
Bassein	C	18						
Cochin	C	1						
Plague-infected rats		3	2					
Rangoon	C	6						
Indochina (French)	C	3						
Thailand:								
Bangkok	C	3						
Bisnulok Province	C	3						
Chingmai	C	3						
Dhonpuri Province	C	1						
Jayanad Province	C	3						
Kamphaeng Bajr Province	C	29						
Kanchanapuri Province	C	12						
Koan Kaen Province	C	5						
Nagara Svarga Province	C	30						
Noangkhay Province	C	4						
Sukhodaya Province	C	22						
EUROPE								
Portugal: Azores Islands	C	2						
SOUTH AMERICA								
Argentina:								
Catamarca Province	C	8						
Cordoba Province	C	[5] 31	[6] 12					
Jujuy Province	C	9						
La Rioja Province	C	1						
Salta Province	C	8						
San Luis Province	C	1						
Santiago del Estero Province	C	76	8					
Tucuman Province	C	20	1					
Brazil:								
Alagoas State	C	9						
Pernambuco State	C	4						
Ecuador: El Oro Province	C	6						

[1] Includes 5 cases of pneumonic plague.
[2] A report dated May 11, 1940, stated that there was an epidemic of bubonic plague in southern Morocco where several hundred cases had been unofficially reported.
[3] Imported.
[4] Information dated July 7 states that up to July 6, 17 cases of plague had been reported near Tungliao, Hsingan Province, China; and a report dated July 13 states that an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh. Information dated Aug. 17 states that 45 cases of plague with 36 deaths have occurred in Nungen District and a telegram dated Oct. 2 states that 15 cases of bubonic plague with 8 deaths occurred in Hsinking, Manchuria. During the week ended Nov. 16, 1940, an epidemic of bubonic plague was reported in Ningpo District, Chekiang Province, China.
[5] Includes 11 cases of pneumonic plague.
[6] Includes 4 suspected cases of pneumonic plague.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

Place		January-September 1940	October 1940	November 1940—week ended— 2	9	16	23	30
Peru:								
Cajabamba Department	C	1						
Cajamarca Department	C	27						
Lambayeque Department	C	12						
Libertad Department	C	47						
Lima Department	C	47						
Piura Department	C	6						
Tumbes Department	C	[7] 19						
OCEANIA								
Hawaii Territory: Plague-infected rats		39	4					

[7] Includes 3 suspected cases.

SMALLPOX

[C indicates cases; D deaths]

Place		January-September 1940	October 1940	November 1940—week ended— 2	9	16	23	30
AFRICA								
Algeria	C	5						
Angola	C	103						
Belgian Congo	C	3,010						
British East Africa	C	52						
Dahomey	C	52	19	8	2			
French Guinea	C	13						3
Gibraltar	C	[1] 1						
Ivory Coast	C	118			6		12	
Nigeria	C	2,028						
Niger Territory	C	599			8			33
Nyasaland	C	74						
Portuguese East Africa	C	1						
Rhodesia:								
Northern	C	6						
Southern	C	204	23					
Senegal	C	145					1	3
Sierra Leone	C	10						
Sudan (Anglo-Egyptian)	C	518	7		4	1	1	1
Sudan (French)	C	1		1			1	
Union of South Africa	C	106						
ASIA								
Arabia	C	255						
China	C	830	1			1		
Chosen	C	533						
Dutch East Indies—Sabang	C	4						
India	C	154,740						
India (French)	C	5						
India (Portuguese)	C	20						
Indochina (French)	C	1,297	41		82		19	
Iran	C	177						
Iraq	C	479	138	44	20	44	38	11
Japan	C	500						
Straits Settlements	C	1						
Sumatra	C	1						
Thailand	C	182	7	3	3	1	5	
EUROPE								
Great Britain	C	2						
Greece	C	23						
Portugal	C	854	7	3	3			
Spain	C	605						
Turkey	C	139						
NORTH AMERICA								
Canada	C	7	2		2	1		
Guatemala	C	35						
Mexico	C	55						
SOUTH AMERICA								
Bolivia	C	288						
Brazil	C	3						
Colombia	C	1,570						
Ecuador	C	1						
Peru	C	104						
Venezuela (alastrim)	C	167	11					

[1] Imported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January-September 1940	October 1940	November 1940—week ended— 2	9	16	23	30
AFRICA								
Algeria	C	1,784	35		32		23	
Belgian Congo	C	1,210						
British East Africa	C	2						
Egypt	C	3,595	20	4	2	10	5	
Eritrea	C	40						
Morocco	C	277						
Rhodesia, Northern	C		7					
Tunisia	C	515					8	16
Union of South Africa	C	154						
ASIA								
China	C	2,100	27					
Chosen	C	359						
India	C	3						
Indochina (French)	C	2						
Iran	C	233						
Iraq	C	128	28					2
Japan	C	2						
Palestine	C	125	49	7		12	3	7
Straits Settlements	C	7	2					
Sumatra	C	[1] 1						
Trans-Jordan	C	15						
EUROPE								
Bulgaria	C	139	6		2	3	2	
Germany	C	213						
Greece	C	34	3		1			1
Hungary	C	77	1					
Irish Free State	C	10						
Lithuania	C	115						
Rumania	C	1,248	8		2	2	10	7
Spain	C	14						
Turkey	C	515	9					
Yugoslavia	C	282						
NORTH AMERICA								
Guatemala	C	279	2					
Mexico	C	192	5	1	1			
Panama Canal Zone	C	3						
SOUTH AMERICA								
Bolivia	C	626						
Chile	C	275						
Ecuador	C	2						
Peru	C	667						
Venezuela	C	11	1					
OCEANIA								
Australia	C	10						
Hawaii Territory	C	21	1				3	

[1] For the month of July 1940.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-September 1940	October 1940	November 1940—week ended— 2	9	16	23	30
AFRICA								
Belgian Congo: Yatolet	C						1	
Cameroon: Nkongsamba	C	[1] 1						
French Equatorial Africa: Fort Archambault	C	[1] 1						
Gold Coast	C	1						
Ivory Coast [2]	C	[3] 4	[1] 1					
Nigeria:								
Ibadan	C	1						
Oshogbo	C	[1] 1						
Sudan (Anglo-Egyptian): Kordofan Province	C				773		85	
Sudan (French): Segou	C				[1] 1			
Togo (French)	C	1						

[1] Suspected.
[2] During the week ended Dec. 7, 1940, 1 suspected case of yellow fever was reported in Seguela, Ivory Coast.
[3] Includes 2 suspected cases of yellow fever.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER—Continued

Place		January-September 1940	October 1940	November 1940—week ended— 2	9	16	23	30
SOUTH AMERICA								
Brazil:								
Espirito Santo State	D	[4] 28						
Rio de Janeiro State	D	[4] 1						
Colombia:								
Antioquia Department—San Luis	D	2						
Caldas Department—								
La Pradera	D	1						
Samana	D	1						
Victoria	D	1						
Intendencias and Commissaries	C	1						
Meta Department	D	2	1					
Municipality of Jesus Maria	D	1						
Santander Department	D	1	1					

[4] Jungle type.